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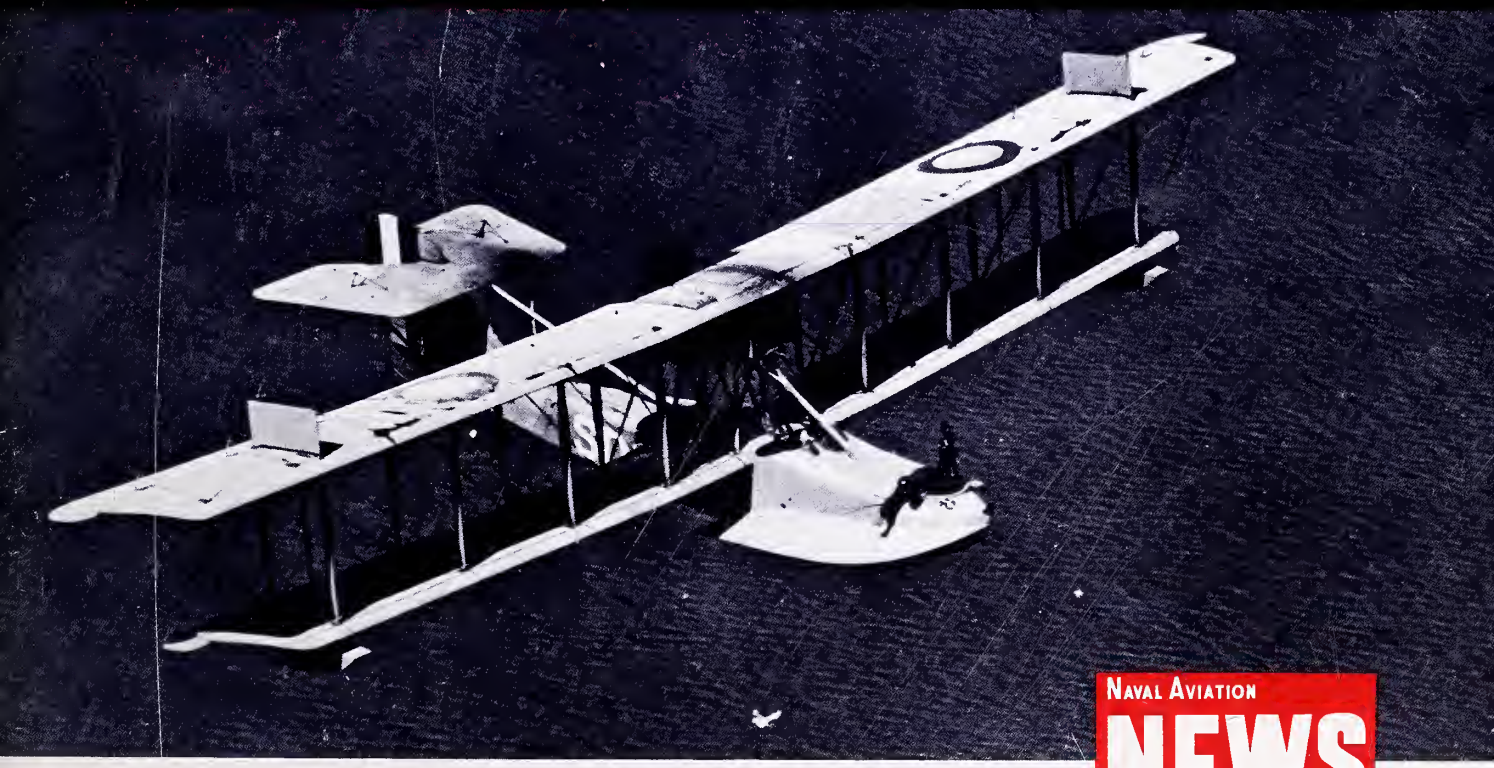


NAVAL AVIATION NEWS

ISSUED BY THE OFFICE OF THE CHIEF OF NAVAL OPERATIONS

FLARE

NAVAL AVIATION IN WORLD WAR I

BY ADRIAN O. VAN WYEN
Historian, Deputy Chief of Naval Operations (Air)

and the Editors of

NAVAL AVIATION NEWS

UNIV. OF FLORIDA LIBS.
DOCUMENTS
DEPARTMENT
U.S. DEPOSITORY

PUBLISHED BY THE CHIEF OF NAVAL OPERATIONS
WASHINGTON, D.C. • 1969

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C. 20402 - Price $1.80
Stock Number 008-046-00011-5
Catalog Number D207.10/2:AV5/2

When the call to battle sounded in April 1917, the Navy air arm could muster at its one air station only 48 officers and 239 enlisted men with some experience in aviation and 54 aircraft none of which was fit for patrol service. The problems of building this small force into an effective fighting unit were enormous. Yet, when the Armistice was signed 19 months later, there were 43 air stations in operation at home and abroad, an aircraft factory in production, and numerous schools, assembly plants, repair depots and other facilities providing the needed logistic support. Aviation personnel numbered over 39,000, a figure nearly equal to the total in the entire Navy at the start of the war.

Little had been published on the nature and extent of Naval air operations in the First World War until, in April 1967, Naval Aviation News began a series of monthly articles under the general title, "Naval Aviation in World War I." Using chronologies of significant events and narrative accounts of special phases of the war, this series told the story of how Naval Aviation met the challenge.

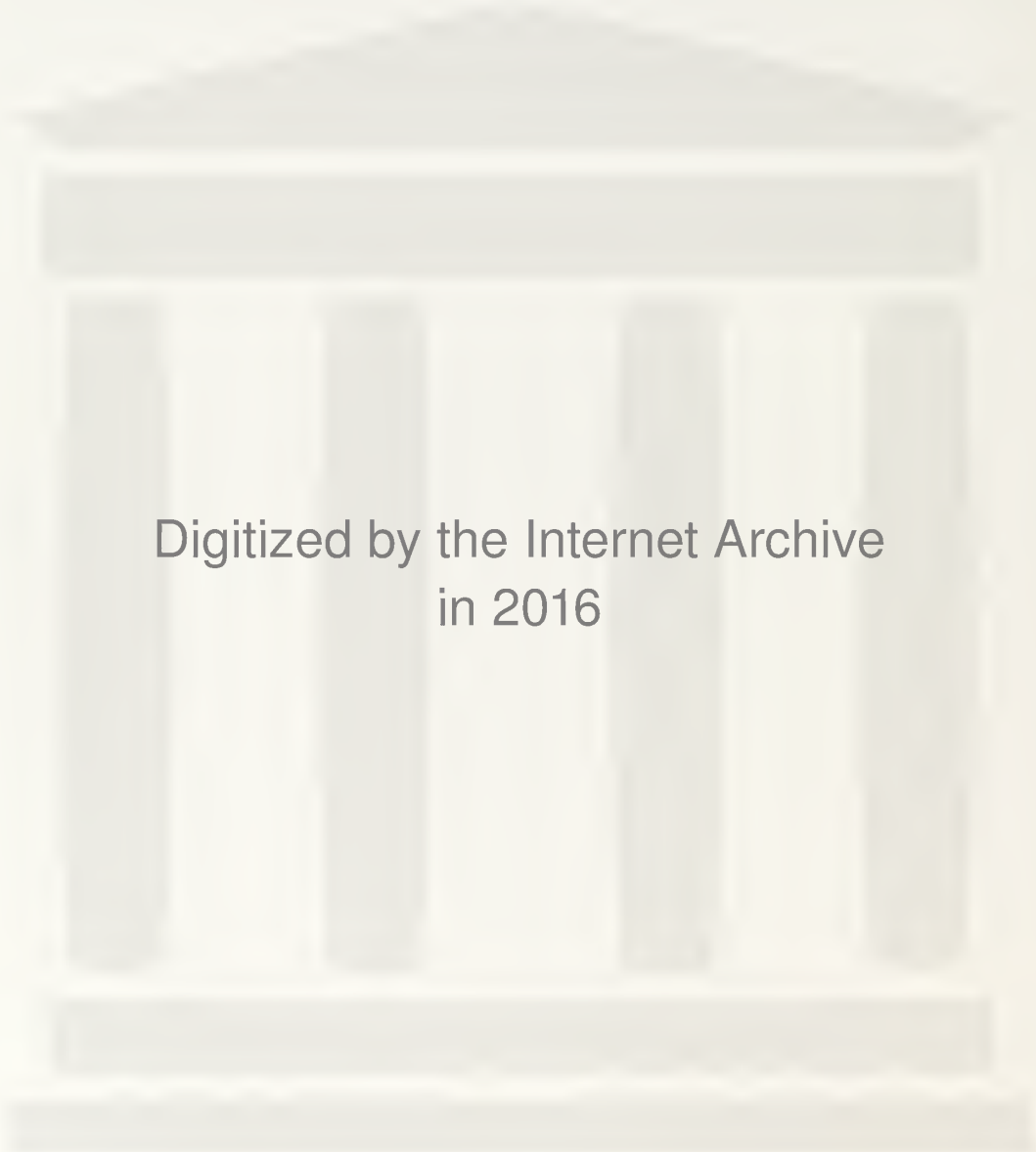
The series was conceived by and completed under the direction of the Assistant for Aviation History, Mr. A. O. Van Wyen, who also wrote many of the articles and arranged for the writing of others. While not a definitive history, it is the first published work to deal specifically with the accomplishments of Naval Aviation in the first World War. Based on official sources as well as the recollections of participants, it is authoritatively presented through an interesting combination of official and personal accounts.

It is also the history of a beginning made under stress of war — a beginning in which the men of Naval Aviation first demonstrated the potential of aviation as an arm of sea power and set the course for its future growth. The success with which they carried out their task is in large measure responsible for the position of aviation at the forefront of Naval power today.

Thomas F. Connolly

T. F. CONNOLLY
Vice Admiral, USN
Deputy Chief of Naval Operations (Air)

HS-2 FLYING BOAT WITH DAVIS GUN IN BOW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IN JANUARY 1917 SCENE AT PENSACOLA ARE THREE STURTEVANTS, A GALLAUDET AND N-9'S IN BACKGROUND

IN THE BEGINNING ...

THE DECLARATION of war against Germany on April 6, 1917, found United States Naval Aviation unprepared for the task ahead. The strength—almost too optimistic a term—of Naval Aviation stood at 48 officers and 239 enlisted men with some aviation experience, 54 aircraft of training types, one free balloon, one kite balloon, one unsatisfactory dirigible and one air station. This was the nucleus around which an effective fighting force would be built.

Though it had been six years since the first aircraft had been acquired by the Navy and its first pilots trained, the Navy had nothing resembling a formally organized aviation force. Only the first faltering steps toward developing operational units had been taken.

Very naturally, the emphasis in the early years was on training. In April 1917, the training program was just recovering from the effects of a six-month hiatus that began in June 1916 when accidents underscored the unsatisfactory nature of the aircraft in use.

The effect of the $3½ million provided for aviation in the Naval Appropriations Act of August 29, 1916, had not been felt. The Naval Flying Corps, authorized by the same act, had not been established. Aircraft manufacturing was undergoing some measure of expansion as a result of orders from abroad, but not as a result of Navy orders. Although suitable sites for air bases along the East Coast had been selected, their establishment and construction were still in the planning stage.

Some advance had been made in flight training after the delivery of N-9's late in 1916 and the experiments conducted with shipboard catapults had borne some fruit. The USS *North Carolina* was equipped with gear necessary to carry and operate aircraft; the USS *Huntington* and the USS *Seattle* were being similarly equipped.

Outside the Navy, interest in aviation was widespread. Aviation elements existed in the Naval Militia and in the National Naval Volunteers and, without much practical Navy support, a start had been made in training men to fly the airplanes and mechanics to keep them flying. Student groups at universities, led by the unit formed at Yale, found the money to buy aircraft and hire instructors. Other young men not associated with the organized units were taking instruction on the chance of joining them.

Curtiss and other enterprising manufacturers had set up schools not only to profit from the growing interest but also to stimulate its continued growth. Rear Admiral Robert E. Peary, an ardent advocate of aviation and one fully aware of the possibility of war, raised money by individual subscription to form the National Coastal Patrol Commission. Its first unit, Aerial Coastal Patrol No. 1, was composed mainly of men from the First Yale Unit. From these efforts, there were many fully or partially trained aviators when war came and many more who recognized the aviation potential.

The air station at Pensacola had opened in January 1914. Its flight

training program was informal although in the next three years some progress was made toward developing a formal curriculum. Personnel were assigned individually, rather than in groups. In consequence, training was sporadic and, although men assigned in the summer of 1915 were generally considered the first class at Pensacola, the station still lacked the formality of class organization.

Ground school for prospective pilots stressed the technical aspects of aviation but, because all the students were Annapolis graduates, omitted entirely such subjects as navigation and fundamentals of seamanship. These courses were added later when officers were recruited from civilian status. Training of airplane mechanics was more formal, but these classes had only been started recently.

ALTHOUGH the years preceding the declaration of war against Germany left much to be desired in terms of training, organization and numbers of pilots and aircraft, there were notable events that pointed to a future in which airplanes would go to sea and take their place in the growing arsenal.

Air operations in the Fleet were inaugurated January 6, 1913, when the entire naval aviation element set up the Aviation Camp on Fisherman's Point, Guantanamo Bay, Cuba. As part of Fleet maneuvers, aircraft flew scouting missions and were charged with spotting mines and submerged submarines. Such activities served to demonstrate the operational capabilities of the aircraft and to stimulate an interest in aviation among the personnel.

On April 20, 1914, an aviation unit was first called into action with the Fleet. Twenty-four hours after receiving orders, three pilots, 12 enlisted men and three aircraft, commanded by Lt. John H. Towers, sailed from Pensacola aboard the USS *Birmingham* to join Atlantic Fleet forces operating off Tampico in the Mexican crisis. The next day, a second aviation detachment, commanded by Ltjg. P. N. L. Bellinger—one pilot, three student pilots and two aircraft—also from Pensacola, embarked in the *Mississippi* upon the same mission.

In the vicinity of Veracruz on May 6, the Curtiss AH-3 hydroaeroplane, piloted by Ltjg. Bellinger, with Ltjg. R. C. Saufley as observer, was hit by rifle fire while making a reconnaissance flight over enemy positions—the first marks of combat on a Navy plane.

Such activity furthered the importance of aviation in the Navy and the Secretary of the Navy Josephus Daniels boldly announced that the point had been reached "where aircraft must form a large part of our naval forces for offensive and defensive operations."

In the process of developing aviation, many a hard-set Navy record was chalked up as pilots proved by courage and tenacity the potential of aircraft.

On October 6, 1912, Lt. John H. Towers, flying the Curtiss A-2, took off from the water at Annapolis at 6:50 A.M. and remained in the air six hours, ten minutes, 35 seconds, setting a new American endurance record for planes of any type.

On December 3, 1915, Lt. Saufley, flying the Curtiss AH-14, set an American altitude record for hydroaeroplanes, reaching 11,975 feet over Pensacola and surpassing his own record of 11,056 feet which he had set only three days before.

Lt. Saufley, again flying a Curtiss hydroaeroplane at Pensacola, bettered on March 29, 1916, his earlier record with a flight to 16,010 feet and, on April 2, extended it again, this time to 16,072 feet.

A little over two months later, June 9, 1916, on an endurance flight in the AH-9 over Santa Rosa Island off Pensacola, Lt. Saufley crashed to his death after being in the air eight hours, 51 minutes.

When war came, the Naval Aviation program was marked by improvisation. In April 1917, several privately owned fields and schools, plus those of the Naval Militia at Squantum and Bay Shore, were placed under the jurisdiction of the Navy. These facilities served as outlets for the initial expansion of aviation and carried the load until stations of a more permanent type could be built. Base construction began at once.

The training program was revised to permit assignment of new classes every three months for an 18-month course for either heavier-than-air or lighter-than-air pilots. But no sooner was its implementation approved than it was abandoned as impractical once the expansion began. So that the heavier-than-air training might be concentrated at Pensacola and the lighter-than-air training be more efficiently conducted, negotiations were completed with Goodyear for a balloon and dirigible school at Akron. About the same time, a contract was made with the Curtiss Exhibition Company to give flight training at the Curtiss School at Newport News, Va.

To meet the growing demand for aviators, a training section was organized in the Office of Aviation (Operations) under the direction of Lt. Earle F. Johnson. Johnson not only supervised training, but also had cognizance over the enrollment of candidates for pilot training. He also directed the movement of personnel by coordinating the assignments with the Supervisor of the Naval Reserve Flying Corps, LCdr. John H. Towers. The multiple activities connected with these tasks combined to make the training section one of the most important offices at the start of the war and one of the largest sections of the Aviation Division at war's end.

THE FIRST THREE MONTHS: APRIL, MAY, JUNE, 1917

The small group of Navy and Marine Corps Aviators, whose enthusiasm and persistence had nurtured the early growth of aviation, was neither large enough nor well enough equipped to wage war. When the call came on 6 April 1917, only one air station was in operation, with 48 qualified pilots and student aviators and 239 enlisted men. The Navy had one airship and three balloons, and none of its 54 aircraft had been designed for the work that was now required.

The work of molding this force to meet the requirements of war began slowly and gathered momentum as it went. Its beginning, as marked by the events of the first three months, follows:

PRACTICE TORPEDO DROP IS MADE FROM AN R6L PLANE

APRIL

6—The Secretary of the Navy, by approval of the recommendation of a Board on Flying Equipment, established standard flight clothing for the Naval Flying Service and authorized its issuance as Title B equipage. Clothing consisted of a tan sheepskin long coat, short coat and trousers, moleskin hood, goggles, black leather gloves, soft leather boots, waders, brogans and life belts.

7—By Executive Order, the President directed that the Coast Guard be transferred from the Treasury Department to operate as part of the Navy.

14—The Navy's first guided-missile effort began when the Naval Consulting Board recommended to the Secretary of the Navy that $50,000 be apportioned to carry on experimental work on aerial torpedoes in the form of automatically controlled aeroplanes or aerial machines carrying high explosives.

20—The Navy's first airship, DN-1, made its first flight at Pensacola. Its performance was unsatisfactory on several counts and after only two more flights in the same month, it was grounded and never flown again.

26—In a continuation of the experiment started with USS *North Carolina* in late 1915, the catapult installed on USS *Huntington* was given dead load tests at Mare Island. With a pressure of 40 pounds, the new catapult sent the empty launching car down the track with an end speed of 33.6 mph. With a pressure of 95 pounds and a dead load of 700 pounds, an end speed of 45 mph was achieved. *Huntington* thus prepared for employment as the third ship of the U.S. Navy equipped to carry and operate aircraft.

27—The Marine Aeronautic Company, Advance Base Force, was organized at Marine Barracks, Philadelphia Navy Yard, by the transfer of personnel from the Marine Aviation Section at Pensacola, from other Marine Corps units, and from the Marine Corps Reserve Flying Corps. Capt. A. A. Cunningham was in command.

MAY

1—An expansion of the training program was approved which called for assignment of new classes every three months and the establishment of a course of 18 months' duration to qualify officers as pilots of either seaplanes or dirigibles. The program also provided for training enlisted men as aviation mechanics and for selection of a few for pilot training and qualification as Quartermaster.

4—The Commandant of the First Naval District was directed to assume control of the Naval Militia station at Squantum, Mass., for use in air training. On the same date, arrangements were completed to take over the Naval Militia station at Bay Shore, N. Y. These were two of several actions taken immediately after the declaration of war to expand the flight training program while stations of a more permanent nature were being built.

5—The Secretary of War agreed to a proposal made by the Secretary of the Navy that a joint board be established for the purpose of standardizing the design and specifications of aircraft. The board, subsequently established, was originally titled, "Joint Technical Board on Aircraft, except Zeppelins."

5—Pensacola reported on a test in which a Berthier machine gun, synchronized to fire through the propeller, was fired from a Curtiss R-3 taxying on water and standing on the beach.

15—The Secretary established an order of precedence for work involved in the preparation for war. "Aircraft and their equipment" were ninth on a list of 20 major fields of material procurement.

16—The Aircraft Production Board was established, by a resolution of the Council of National Defense, as a subsidiary agency to act in an advisory capacity on questions of aircraft production and procurement. Membership included a representative from each service, the Navy's being RAdm. David W. Taylor.

17—Aircraft Machine Gun Procurement—The Chief of Naval Operations requested purchase of 50 aircraft machine guns, synchronized to fire through propeller, and another 50 for all-around fire.

17—Cdr. Noble E. Irwin was ordered to the Material Branch to relieve Lt. J. H. Towers as officer-in-charge of the aviation desk in the office of CNO. Lt. Towers was given additional duty orders to the Bureau of Navigation as Supervisor of the Naval Reserve Flying Corps.

19—The first national insignia adopted for U.S. aircraft was described in General Orders and ordered placed on all naval aircraft. It was a red disc within a white star on a blue circular field on the wings, and red, white and blue vertical bands with blue forward, on the rudder.

19—The Chief of Naval Operations requested that two small seaplanes and one pilot be detailed for duty in connection with radio experimentation at Pensacola.

19—Seven student aviators comprising the Harvard unit, with Lt. H. B. Cecil in charge, reported to the Curtiss Field at Newport News, Va., for flight instruction.

23—The initial production program to equip the Navy with the aircraft necessary for war was recommended by the Joint Technical Board on Aircraft. It was to consist of 300 school machines, 200 service seaplanes, 100 speed scouts, and 100 large seaplanes. The N-9 and R-6 were listed as the most satisfactory for school and service seaplanes, but others were not sufficiently developed to permit a selection.

29—A contract was made with Goodyear Tire and Rubber Co., Akron, Ohio, to train 20 men in the operation of lighter-than-air craft.

30—The Navy's first successful airship, the B-1, completed an overnight test flight to Akron from Chicago where it had been assembled. The pilot was R. H. Upson of Goodyear.

JUNE

4—The construction of five prototype models of 8- and 12-cylinder Liberty motors was authorized by the Aircraft Production Board and the Joint Technical Board of Aircraft. Commencing on 29 May, the design of these engines, based on conservative engineering practices especially adapted to mass production techniques, had been worked out in a room in a Washington hotel by two engineers—J. G. Vincent and E. J. Hall of the Packard Motor Car Company and the Hall-Scott Motor Car Company, respectively.

5—Part of the First Aeronautic Detachment arrived at Pauillac, France, aboard USS *Jupiter* and its second echelon, on board USS *Neptune,* arrived at St. Nazaire three days later. The detachment, which was the first U.S. military unit sent to Europe in World War I, was composed of seven officers and 122 enlisted men under command of Lt. Kenneth Whiting.

11—USS *Seattle,* which in late 1916 had become the second ship of the U.S. Navy equipped to operate aircraft, made ready for convoy duty at the Brooklyn Navy Yard by transferring all aviation personnel and gear ashore and securing her catapult to the deck where it would not interfere with normal operations. This eliminated *Seattle's* chance to prove herself as an aviation ship in war.

14—The establishment of coastal patrol stations in the United States was initiated when the first base contract was let. Sites covered by the contract were all on Long Island, at Montauk Point, Rockaway Beach and Bay Shore, the last destined to become a training station.

20—The first Curtiss R-5 twin-float seaplanes assigned to naval service were received at NAS Pensacola. R types were assigned briefly to cruisers, saw some service in flight training and were used in many of the early experiments with torpedoes.

22—Enlisted men of the First Aeronautic Detachment began preliminary flight training in Caudron aircraft under French instructors at the *Ecole d'Aviation Militaire* at Tours, France.

22—Change No. 11 to Navy Uniform Regulations made the first special provision for aviators. It provided a summer service flying uniform of Marine Corps khaki of the same pattern as service whites, which was to be worn only when on immediate duty with aircraft. The order also provided for a coverall of canvas, khaki or moleskin of the same color as the uniform, as a working dress uniform.

28—Thomas W. Barrett, a member of the First Aeronautic Detachment, was killed in a crash of his airplane while under flight training at Tours. He was the first Navy man killed in France in WW I.

CAPT. IRWIN HEADED U.S. NAVAL AVIATION IN WW I

PILOTS WERE TRAINED IN FRENCH 'CAUDRON' BY FRENCH INSTRUCTORS

FIRST NAVAL AVIATION UNIT IN FRANCE

Of the many elements of the United States armed forces sent overseas immediately after the declaration of war, one of the first to get there was a detachment from Naval Aviation. This token aeronautical force, sent in response to a request from the French government to bolster morale, was made up of men only partially trained at Pensacola. Once their training was completed at French stations under French instructors, these men would make up the first cadres for United States air stations yet to be located and built. The story of these men is ably related by one of them.

By Joe C. Cline

We were really a split-up outfit that became attached to every man's army and every man's navy. One thing brought us together—mechanics, carpenters, college students, taxi drivers, farmers—we all wanted to fly. And soon—without much training—we did. We flew with the French, the British and the Italians. Some of us even flew with the United States Marines, but most of us never fired an American machine gun or dropped an American bomb, or even saw an American-made plane until we got back home.

There were only 122 of us, and we were probably the most oddly assorted outfit that ever sailed to France.

In early June, 1917, General Pershing was in England, still on the way to France, the First Division of the Army was still in America, the draft law was being implemented, and we, the First Aeronautic Detachment of the U.S. Navy, were landing in France.

We were the first fighting force from the United States to set foot on French soil after the declaration of war.

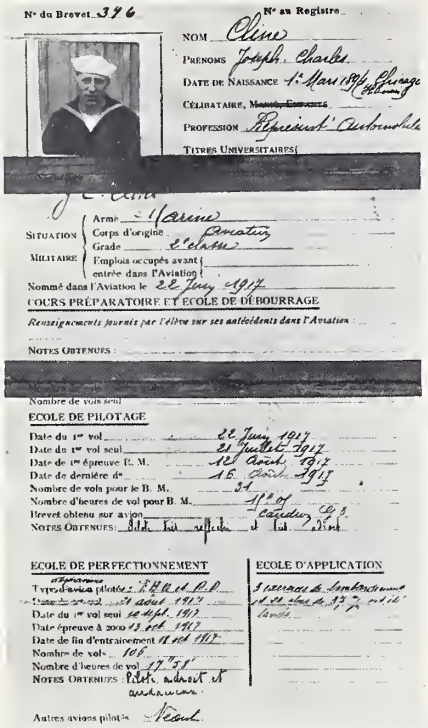
On April 3, 1917, I enlisted in the United States Navy as a Landsman for Quartermaster (Aviation) after having served four years in the Illinois Naval Militia. I arrived the next day at NAS Pensacola for flight training. At that time, there was no cadet status for student aviators; in fact, there were no ground school or flight instruction provisions for such a large group. Only a few regular Naval Aviation officers were attached to the station at that time.

All of us were volunteers. We came from nearly every state in the Union and nearly every walk of life. We were utterly green and inexpressibly eager.

After about three weeks of drilling and some Navy indoctrination, where I found my Naval Militia experience a definite asset, volunteers were called for duty in a foreign country. Fifty Landsmen for Quartermaster and 50 Landsmen for Machinist Mate were selected. Quartermasters were to be trained

ONE AIRCRAFT ASSEMBLY CENTER WAS LOCATED IN HANGARS AT BREST

'The instructor . . . gave you hell in French



N° du Brevet 396 — N° au Registre

NOM Cline

PRÉNOMS Joseph Charles

DATE DE NAISSANCE 4 Mars 1894 Chicago

CÉLIBATAIRE, Marié, Divorcé

PROFESSION Répresentant Automobile

TITRES UNIVERSITAIRES

SITUATION MILITAIRE — Armée Marine; Corps d'origine Aviation; Grade 2e Classe; Emplois occupés avant entrée dans l'Aviation

Nommé dans l'Aviation le 22 Juin 1917

COURS PRÉPARATOIRE ET ECOLE DE DÉBOURRAGE

Renseignements fournis par l'élève sur ses antécédents dans l'Aviation

NOTES OBTENUES

Nombre de vols seul

ECOLE DE PILOTAGE

Date du 1er vol 22 Juin 1917

Date du 1er vol seul 21 Juillet 1917

Date de 1re épreuve B. M. 12 Août 1917

Date de dernière dº 15 Août 1917

Nombre de vols pour le B. M. 34

Nombre d'heures de vol pour B. M. 11h 07

Brevet obtenu sur avion Caudron G 3

NOTES OBTENUES: Bon élève, adroit et audacieux

ECOLE DE PERFECTIONNEMENT — Type d'avion pilotés: S.P.A. et R.B.

Date du 1er vol 21 août 1917

Date du 1er vol seul 30 Sept. 1917

Date épreuve à zéro 13 Oct. 1917

Date de fin d'entraînement 11 Oct 1917

Nombre de vols 106

Nombre d'heures de vol 37 h 55'

NOTES OBTENUES: Pilote adroit et audacieux

ECOLE D'APPLICATION — 3 secteurs de bombardement de nuit chez les Anglais

Autres avions pilotés: Néant

CLINE'S FRENCH BREVET, NO. 346

AVIATORS McGUIRK AND CLINE

as pilots and Machinist Mates were to be trained in maintenance and overhaul duty, but they ended up as Observers, Machine Gunners and Bombardiers in everybody's army or navy. They became the First Aeronautic Detachment of the United States Navy.

In a few days, the outfit was split up. We shoved off for duty aboard two Navy colliers, the USS *Jupiter* (later the first U.S. aircraft carrier, the *Langley*) at Hoboken and the USS *Neptune* at Baltimore.

I reported to the latter in Baltimore where we loaded grain and flour for a week. Then we shoved off for Norfolk and additional supplies and sailed for France with the destroyers, USS *Perkins* and USS *Jarvis,* as escorts. After a 12-day crossing, we landed in St. Nazaire, France, on June 8, 1917. (The first echelon in the *Jupiter* had arrived three days earlier, on June 5.) Our commanding officer was Lt. Kenneth Whiting, USN.

After we arrived in France, nobody knew what to do with us. Lt. Whiting rushed off to Paris to see the American Ambassador, the Naval Attache, the French Minister of Marine and a few others. There was a conference in Paris. It was agreed that the French would train us. They would supply us with airplanes, motors, instruments, armament, bombs and accessories—in which the United States was woefully lacking—and construct three air stations for us while we were in training.

In a few days, we shoved off for Brest, then to a small fishing village near the entrance of the Bay of Brest, and took over barracks that were once used by Napoleon's troops. We had to wait until the class of French students at the flying school at Tours had finished training. This took about ten days.

One rainy night we arrived at Tours. We were loaded into trucks and driven to the *Ecole d'Aviation Militaire de Tours* and began flight training on June 22.

None of us had had any ground school instruction and few of us had any idea about the theory of flight. Our instructors did not speak English and we did not speak French. We were divided into small groups of eight or ten students, each group assigned to an instructor. One leather flying coat, one pair of goggles and one crash helmet were issued to each group and these were passed from one student to another as his turn came to fly.

The plane used for our primary instruction was the Caudron G-3, a French biplane with warping wings and a two-place cockpit, powered by a 90-hp Anzani or LeRhone engine. The instructor sat in the rear cockpit. After takeoff, he would turn controls over to the student and instructions would begin. If the nose was too high, the instructor would push forward on your helmet. If it was low, he would pull back on the helmet. If the left wing was down, he'd tap on the right shoulder; right wing down, tap on the left shoulder. A flight lasted about 20 minutes.

After each flight, the instructor would pull out a pasteboard card with a line drawn down the center. One side was written in English and the other in French. The instructor would explain all the mistakes you had made while in flight. He gave you hell in French while pointing to the English translation. Perhaps it was just as well we did not understand his words.

One day an amusing conversation with a French student took place. Our instructor, Benaush, who was in charge of the class in dead stick landings on a spot from 2,000 meters, was very excitable and emotional. At these times, he would shout and scream at a student who was doing something wrong in the air, throw his hat and cane and anything within reach. The French student explained, "Benaush is good pilot. He knows everything student does wrong. When he does, he will throw away his hat. If he is getting in worse

trouble, he will throw away his cane. And if at last he throws away his pipe, the man is dead."

I think about two-thirds of our group of 50 students qualified to solo under these adverse conditions, and each one did so in less than five hours of dual instruction, which is an indication of the ingenuity of American youth.

The course at Tours included a cross-country flight to Vendome, to a British flight school about 80 miles distant and return, a spot landing from 4,000 feet with dead stick on a small field we called the salad patch and an altitude test to 8,000 feet where we were required to stay for one hour.

We were than sent to *Ecole d' Aviation Maritime de Hourtin* on a small lake outside Bordeaux. This was a French Navy Base where we were to receive our preliminary seaplane training. Our instructors were French non-commissioned officers, also non-English speaking.

There were no barracks available, so we pitched tents among the scrub pine woods on the shore of the lake. Our three mess boys cooked our meals, consisting of French rations in the French galley with a choice of red or white wine. Our mess hall was the outdoors under the pine trees; our table, boards placed on empty gas drums. Like all youngsters, we thought this was a great way to fight a war. Our skipper was Lt. Virgil Griffin, USN. In a few days we were joined by Ens. Artemus Gates, USNR, of the Yale unit.

The planes were seaplanes of the F.B.A. (Franco-British Aviation) type, a biplane pusher, powered by a 90-hp rotary engine. After three hops with an instructor for about 15 minutes each, I soloed this little boat and found quite a difference between landplanes and seaplanes. It was much more difficult to gauge distance when landing on smooth water.

After a month at Hourtin, we were sent to *Ecole d'Aviation de St. Raphael,* in the south of France on the Mediterranean. This was the Pensacola of the French Navy. Ens. Gates was in charge of our first group, and Lt. Grattan Dichman was skipper of the American students. Here we started right in flying all types of French seaplanes —F.B.A., Tellier, Salmsons and Donnet-Denhaut (DD) — completing the course in altitude tests, rough water landings, bombing and gunnery.

On October 17, 1917, I received my French Brevet, Number 346. My total flight time, including Tours, Hourtin and St. Raphael, was 31 hours and 52 minutes. I was ready for war, still a Landsman for Quartermaster; pay $17.60 a month.

Many of the Quartermasters who did not complete flight training and most of the Machinist Mates were sent to the French Army School of Aerial Gunnery at Caseaux to be trained as observers. Other members of the detachment were scattered all over Europe that summer. Some were sent to our station at Bolsena, Italy, for training with the Italian Navy. On receiving their Italian Navy wings, they were assigned to NAS Porto Corsini, Lt. W. B. Haviland commanding.

It was from this station that Haze Hammann of the Baltimore gang put his name on the honor roll with his daring rescue of a fellow pilot under attack by Austrian aircraft off the naval base of Pola. They gave him the Medal of Honor, the Italian War Cross and the Silver Medal of Valor. Admiral Sims said of his work that day, "I know no finer individual exploit in the war."

Our next form of training was in a construction gang where we started to build the Navy's aviation training station at Moutchic. We built canvas hangars, shoveled sand, broke rocks, slept in tents again. Our mess hall was some airplane crates in which a few F.B.A. seaplanes arrived. These we assembled and flew at intervals in order to keep us from forgetting we were pilots. This tour of obnoxious duty was to last only a few weeks until people from the States began to arrive and take over the building. Some of the Yale unit arrived, including Ens. Robert Lovett, USNRF.

Orders were then reached for us to transfer to NAS LeCroisic, on the Bay of Biscay near St. Nazaire. We arrived there the first week in November, and the first offensive patrol by an American flyer in the service of the United States was made on November 18, 1917. Our commanding officer was Lt. William Corry, USN.

Pilots of the First Aeronautic Detachment who reported for duty at this station were: Foss Hardendorf, Paul Gillespie, Bob Harrell, Lon Harvie, Charlie Boylan and I. We were still enlisted men in the U.S. Navy. We were joined there by Ensigns Ken Smith, Sam Walker, Reggie Combs, Henry Landon, USNRF, all of the Yale unit, and Ensigns Fred King Becker and Thomas Ryan, USNRF.

We flew French Tellier seaplanes, powered by 220 Hispano engines, and our job was to escort the convoys from the States through our sector from Quiberon to St. Nazaire. Le Croisic, a little fishing village on the north coast of Brittany, was always a welcome sight after a long, cold, four-hour patrol.

Observers at Le Croisic, also of our detachment, were Skaggs, O'Brien, Kneip, Strope, Hobt, Williams, Brady, Studer, Rourke.

Two of our original detachment, Weddell, pilot, and Eddy Kneip, observer, were killed at Le Croisic. Returning from patrol one afternoon in a Tellier, Weddell put the ship in a tight flipper turn before landing and a wing crumbled. They crashed in the bay just off the station.

One day at Le Croisic, three staff cars drew up to the gate and the young ensign Officer of the Day came to attention. He stood aghast

'Our designation . . . was still that of Student Aviator after finishing three different French schools.'

ONE FRENCH SEAPLANE USED WAS DONNET-DENHAUT

when Admiral Sims and Admiral Benson stepped out of the car to make a surprise inspection of the station. After a mad scramble, we managed to get into uniform for personnel inspection.

Mac Weddell, Paul Gillespie and I stood in formation together, proudly displaying our French Brevets on our dress blues. Admiral Sims wanted to know what they were and what they signified. Weddell explained we were aviators, had been trained by the French Navy and had been on active flight duty escorting the convoys through our sector for many months.

The Admiral turned to Lt. Corry and asked why we had not been commissioned. Corry answered he had so recommended on several occasions. The Admiral then summoned one of his staff who took our names. Within two weeks we were ordered to take examinations for commission. We finally became officers, USNRF.

Our designation as pilot was still that of Student Aviator after finishing three different French schools and qualifying in all types of French seaplanes, plus many months at Le Croisic flying convoy escort. It was not until I returned home that I became Naval Aviator No. 1832.

Lt. Corry was transferred to Brest and took command of that naval air station. He had been my inspiration in the Navy and I was most anxious to serve under his command again. I therefore put in for duty at Brest, which was granted, and reported to that station in October 1918. Lt. Corry was relieved at Le Croisic by Lt. William Masek, **USN.**

At Brest I saw my first American airplane. We had heard much, in glowing terms, about the Curtiss HS-1 seaplanes with the famous Liberty engine. These were arriving from the States. After all necessary equipment for submarine patrol, such as bombs, radio, aldis lamp and battery, pigeons, machine guns, fire extinguishers and a full load of gas were loaded on the plane for a four-hour patrol, nobody could get the plane off the water. In a short time, a modification was made on the plane by adding six feet to the wing span and this aircraft was designated the HS-2. It was still necessary to install three strands of salmson cord on the right rudder bar to offset torque in order to fly this crate.

These planes were assembled at Brest and then delivered to our air stations along the French coast. Planes were also being assembled for these stations at Pauillac, the main aviation supply base which had been established for the use of the U.S. Navy in France.

The French Naval Air Station

at Dunkerque had been under periodic attack by German aircraft from Ostend and Zeebrugge and bombardment from the sea. This was a strategic location for an air base because of the German submarine pits at Zeebrugge on the North Sea.

The French wanted the U.S. Navy to take over and operate this station, but Lt. Whiting would not recommend doing so without a definite fighter cover.

Therefore, the next group to finish training at St. Raphael was ordered to Paris and then on to Issoudun for training in fighter planes with the French Army. After about a month at this school, orders came to report to an RAF school in England for air gunnery instruction. From there, they went to the Royal Air Force Base at Ayr, Scotland, for further combat training in Sopwith *Camels,* S.E.5's, Bristol fighters, Avro's and D.H.4's.

Members of the First Aeronautic Detachment in this group were the following: Landsmen for Quartermaster Velie, Carson, Hough, Ganster, Chapin, Marshburn, O'Conner, Bamrick, Young, Parker, Jernigan, Elliott and Wardwell. They reported for duty at Dunkerque in February 1918 and flew off a canal Hanriot single-seater pontoon fighters with rotary engines. Lt. Godfrey deC. Chevalier was the commanding officer.

Three of our outfit—Carson, Young and Elliott—caught a German submarine on the surface heading for Zeebrugge. Carson, flying a DD, began the attack with bombs, but was beaten off by cannon and machine gun fire from deck guns. Elliott and Young, who were flying cover, attacked and, with guns blazing, wiped out the entire deck crew. Carson, who was standing off, then returned to the attack, dropped his bombs, and sank the submarine.

When the Armistice was signed and the war was over, the original detachment was split up, serving all over Europe, so that it was impossible to contact many of the old gang again. But the following members, I knew, would never come back: Barrett, Manley, Weddell, Kneip, Velie, Hough, Ganster, Chapin, Marshburn, O'Gorman, Goggins and Nelson.

Many of the First Aeronautic Detachment on returning home were given the opportunity to continue with the Navy. Some became officers in the regular Navy; others made a career in civilian aviation. Harold Elliott became general manager of Eastern Air Lines, Paul Gillespie was managing director of the Roosevelt Flying School on Long Island. Later, he was with the Civil Aeronautics Administration and, during WW II, he was a captain in the Navy in command of NAS New Orleans. Pete Parker for many years was chief pilot for Eastern Airlines. Franklin Young spent many years as pilot-captain for Trans World Airlines. Duke Jernigan was head of the aviation department for Texaco, Inc., and was the first man to tow a glider across the United States. Eddie Nirmaier flew for a radio corporation for years. Charley Boylan operated an air service in New Orleans and was killed in a crash.

I have no idea what happened to many of the others not mentioned, but if any of them are still around and kicking, I hope they keep her nose down and fly straight. They were a great gang.

DETACHMENT WAS AT TOURS WHEN PHOTO WAS TAKEN

AVIATION GROUND

Although there was logic and order apparent in initial actions, neither the aeronautical training plans, nor their implementation, could keep pace with requirements. In 1917, the greatest need was to find some way of assimilating the volunteers who, paradoxically, while making expansion possible, by their very numbers also made it difficult. With more men on board than could be accommodated within the existing structure and others coming in faster than facilities could be provided, it was all too clear that something had to be done—and quickly. And that is the way it was done.

On July 23, 1917, 50 men, with beds and bedding, arrived in Cambridge on the campus of the Massachusetts Institute of Technology from the First Naval District headquarters in Boston. They were met by Ltjg. Edward H. McKitterick. These 50 men were the first increment of over 4,000 who would receive their introduction to the naval service at that school and go from there to carry out their duties in assignments at home and abroad. Many would go to flight training and become Naval Aviators, some would perform ground duties, but not one would forget his days at Tech and the men who set him on a proper course.

So far as the record is concerned, the idea of using the facilities of established civilian educational institutes for the initial stages of military training seems to have sprung full grown out of nowhere. Actually, the experience of the British, who had already been at war three years, established the precedent and appears to have planted the seed. An example of their program on this continent was the Royal Flying Corps School at Toronto.

The problem of training was discussed at a meeting of the National Advisory Committee for Aeronautics (NACA) in Washington on April 23, 1917. This discussion led directly, less than three weeks later, to the establishment of Army courses at six scientific schools across the country. Also involved was the Aircraft Production Board, the chairman of which informed the Secretary of the Navy of the

PIONEER TASK *of organizing the school at MIT fell on Ltjg. Edward H. McKitterick.*

SCHOOLS AT MIT

possibilities. Whatever the influence—and reports from abroad seem to have been most influential—the Navy was fully aware of the possibility of using existing schools for training and, in fact, was contemplating such a program.

New plans for training student officers, formulated in the early months of the war, called for a program in three parts. The first was a ground school of roughly six weeks duration. This would be followed by preliminary flight training to bring the student through from five to ten hours of solo work. In the final stage, advanced flight training, the student would qualify as a Naval Aviator and receive his commission in the Naval Reserve Flying Corps.

Early in July, the Navy made the first move toward setting up the first part of this program at the Massachusetts Institute of Technology at Cambridge. This was a natural choice since the Navy had already established a working relationship with the school through the assignment of Commander Jerome C. Hunsaker to study, and later to teach, at its School of Aeronautical Engineering.

On July 3, 1917, the Secretary of the Navy wrote to MIT President R. C. MacLaurin regarding the possibility of setting up a course for the Navy along lines of that already in progress for the Army. The letter was delayed in delivery but the affirmative reply, which came by telegram, included an invitation to send a representative to discuss needs and make arrangements. On July 10, Lt. E. W. Spencer, commanding the air station at Squantum, was ordered to make the visit.

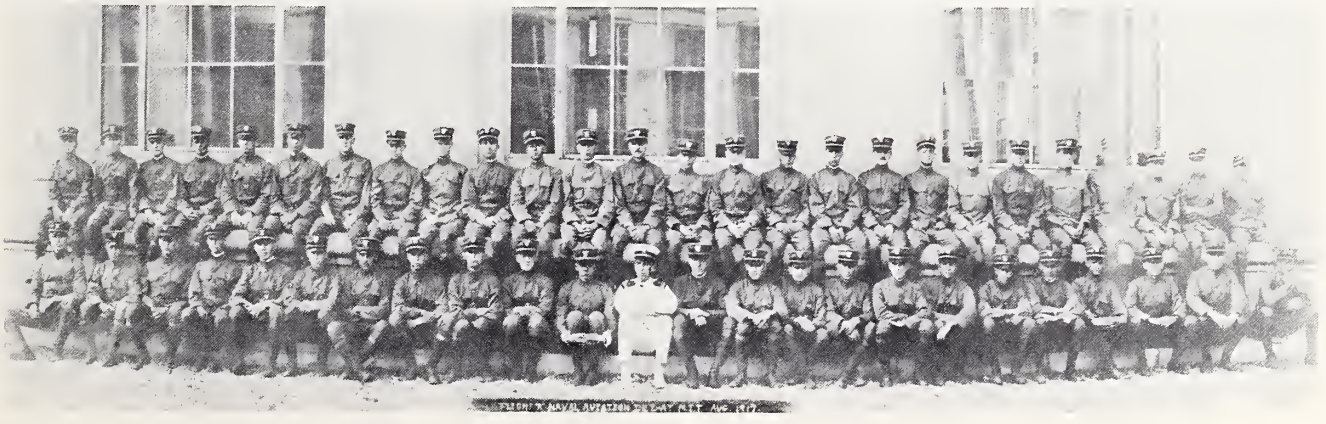
Spencer reported two days later the Institute could provide facilities and an instructional staff for groups of 50 men assigned every two weeks. It would be ready for the first group near the end of the month. On July 14, Lt. E. F. Johnson of the Aviation Training Section arrived from Washington to discuss further details and make final arrangements. On the same day, SecNav directed the Bureau of Navigation to draw up a contract.

The general terms called for facilities for 200 students admitted by classes of 50 every two weeks, an instructional course of two months duration covering aircraft engines, theory of flight, general flying, gunnery, signalling and wireless, and naval studies. The cost per student would be ten dollars per week for the first four weeks, five dollars for succeeding weeks. As its part of the program, the Navy would provide one officer to supervise instruction and command the detachment and at least four men qualified to instruct in naval subjects. Quarters, exclusive of beds and bedding, were to be furnished by the school. This contract, with other standard contractual stipulations, was executed on July 23, 1917.

THE FIRST COMMANDER of the new detachment, Ltjg. McKitterick, was a graduate of the Naval Academy Class of 1912 and a qualified Naval Aviator, then on duty at NAS PENSACOLA. With only a quick stop in Washington to be briefed on plans and arrangements, he arrived at the school on July 23, just in time to meet the first group.

With no staff to assist him, Lt. McKitterick moved his group into spaces provided by the school in Technology Building No. 2 and made plans to begin classes the next day. On the first day, he indoctrinated the recruits and acquainted them with the program. Extemporization was the order of the day. Quarters and classroom space had been assigned but neither an instructional staff nor training materials had arrived. But the experience of the MIT staff in setting up the Army program helped smooth the way.

FIRST NAVAL AVIATION DETACHMENT, FLIGHT A, AT THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY, 1917



LT. E. F. JOHNSON, *head of Naval Aviation Training, Washington, visited detachment.*

The initial Ground School program called for a 40-hour week, the hours being allotted as follows: Navigation, 5; signals, 6; Navy regs, 5; seamanship, 6; calisthenics and boat drill, 5; drill, 5; study, 5, and examinations, 3. As the class progressed, new subjects were introduced. By eliminating some of those taken earlier and by reducing the hours of others, a 40-hour weekly schedule was maintained.

This program prevailed for the first six classes. In October 1917, as a result of a brief visit by the commanding officer to the Royal Flying Corps Ground School at the University of Toronto, the allotment of hours was readjusted, principally in gunnery. For this course, the time was more than doubled. There were lesser increases in signals and rigging. This expansion, and a greater emphasis on physical conditioning—the hours assigned to calisthenics and drill were doubled—combined to bring the total hours of instruction for eight weeks to 428, a load considerably over the earlier 40-hour week.

When Class 7 reported October 15, the strain of the extra hours was eased by extending the course from eight to ten weeks and adding 12 hours of liberty which had been cut to zero by the earlier expansion. The new 440-hour total over ten weeks still exceeded the 40-hour per week limit, but it was tolerable.

After the adjustment, hours assigned to certain subjects again began to creep upward but the increases were held within bounds. As the curriculum became stabilized, a reversion to the original plan was possible and on June 24, 1918, the length of the course was reduced to eight weeks.

In all, there were 12 different distributions of scheduled hours, the last five of which stipulated only minor variations. The changes followed the needs of the service. Special provisions for lighter-than-air men were made with Class 22 in May 1918 and required continual adjustment throughout the program. In October 1917, a special course was set up for Aerial Observers which continued until January 1918 when this training was transferred to NAS Miami.

The organizational relationship of the new school with MIT followed the pattern already established for the Army school. Supervision and responsibility for the program rested wholly with the commanding officer. Control of the academic work was vested in an academic board, made up of all professors and instructors serving the Ground School, headed by a president appointed by the President of the Institute. The departments, each under a head appointed by the President of the Academic Board, were (a) Electricity, Signals and Photography, (b) Seamanship and Navigation, (c) Gunnery, (d) Aeronautic Motors, and (e) Aeronautics, consisting of Theory of Flight and Aircraft Instruments. An examining board, consisting of the president of the academic board and three department heads, passed upon the qualifications of all students making unsatisfactory progress. The commanding officer exercised final authority in judging the fitness of student officers to graduate.

The organization of the student body followed that of a military unit under cadet and petty officers. The detachment was originally organized as one battalion of four companies. At its maximum strength, the detachment was organized as a brigade of two regiments and three battalions. These units, commanded entirely by cadet officers, were supervised by the drill and discipline officer.

For administrative purposes, students were assigned to Flights A, B, C, etc., each group progressing every two weeks to the next flight. The A flight was the senior, or graduating, class. Each group entering was also assigned a class number; there were 34 in all.

The assignment of a new class every two weeks meant four classes on board during eight-week sessions and five classes during ten-week sessions. The total number in attendance at one time ranged from approximately 200 for the first part of the program to roughly 750 during ten-week sessions and some 800 in the final phase.

The first of 363 gunnery sergeants of the U.S. Marine Corps trained at the school was assigned in a group of 25 men on June 1, 1918. This Marine Detachment, which was within rather than separate from the Naval Detachment, was in charge of Capt. Robert J. Archibald, U.S. Marine Corps.

On September 21, 1918, 20 flight cadets of the Royal Canadian Naval Air Service reported for ground school instruction, their uniforms adding considerable color to the detachment. In all, 60 RCNAS cadets were assigned to the detachment.

As the detachment reached its greatest expansion, the Institute campus presented a most military appearance. All day long, groups of students could be seen going through calisthenics, exercises, gas mask and close order drill. All day long, the rattle of machine gun fire came from the gunnery shops while the roaring of aircraft engines running on test blocks echoed from the engine laboratories.

Three men successively commanded the detachment. The pioneer task of organizing the school and setting precedents fell on Lt. McKitterick. He served six months to December 21, 1917, then left to commission and take command of NAS Chatham, Mass. He was relieved on that date by LCdr. R. W. Cabaniss who served roughly seven months before going overseas.

With his arrival a series of orders

LCDR. *R. W. Cabaniss was the second officer in charge, serving for some seven months.*

was published in pamphlet form and furnished to each new arrival. This pamphlet as a guide to proper conduct could well be regarded as a model. The best part of it, however, was the fact that every rule and regulation laid down was enforced with the utmost rigor (as every man would agree).

Cabaniss was succeeded on July 9, 1918 by Lt. H. C. Van Valzah under whose command the development of esprit and appearance of the unit was continued. A band was organized and formal retreats were held at sundown, the entire detachment parading on the drill field between the Walker Memorial and Institute buildings. It was a performance enjoyed by hundreds of spectators from the community.

CHANGING requirements were met by the establishment of special schools which used the facilities of the Institute and the detachment organization, but were set up separately from the Ground School.

The Inspector's School—Establishment of this school was a direct result of wartime expansion. The need for more qualified inspectors of aviation material was met initially by assigning Naval Aviators. Although untrained in the techniques of inspection, they were well enough acquainted with aircraft structures, components and working parts to make a rapid adjustment to the job. But, with too few aviators to fill these and other billets where their skills were needed, the Navy was soon forced to assign less experienced officers. The inefficiency of this practice, in a period when time was a factor in every action and in an industry which in itself lacked the experience of producing aircraft and aeronautical material in volume, was evident.

An intent to use the resources of the Ground School at MIT to develop qualified inspectors was first revealed to the detachment's commanding officer the morning of August 22, 1917, when a newly commissioned ensign reported to the school announcing he had come to take the inspector course. The commanding officer wrote a letter to Washington, expressing some surprise at the development but, at the same time, he agreed that such a course would be desirable and could be developed and handled "without much trouble." He proposed that Professor Alexander Klemin and his assistants be asked to work up a course of about six weeks duration. A week later he reported progress with the remark, "You will have to hand it to the Institute for being on the job on this. They have gone to considerable trouble and I think no little expense in working out their share of the course."

The outline provided for two courses, one for Airplane and the other for Motor Inspectors, each of six weeks duration. The emphasis in both was on the practical matters involved in their specialized work. Both courses began on October 22, 1917, with seven students each. Prospective airplane and motor inspectors took several subjects together and were separated only for their specialties.

The first three classes omitted the regular Ground School subjects. All succeeding classes took the first four weeks of Ground School and devoted the remaining weeks to the specific requirements of their prospective assignments.

The first group of nine men completed the course in December; on January 26, 1918, 35 airplane inspectors were ready for assignment. Between the opening of this school and its closing one year later, on October 22, 1918, 200 students reported for training. Of these, 167 completed the course successfully, 58 as motor inspectors and 114 as airplane inspectors.

Aerography School—Early in the history of Naval Aviation, aviators had expressed the need for special instruments to measure certain weather phenomena, but it took the experience of war to prove the need for officers specially trained in weather forecasting.

As a first step toward training in this field, the commanding officer of the detachment at MIT was asked to investigate the possibility of arranging for a training program at the Blue Hill Observatory of Harvard University. He made his preliminary report late in November and only a week later reported that one student was on board.

The Aerography School opened December 22 as a formal part of the detachment program at the Institute. It ran until the detachment was disestablished in January 1919. Considerable instruction was given at the Blue Hill Observatory but classes were also held in the Aerographic Laboratory at MIT. The six-week course stressed the use of aerographic instruments, the structure of the atmosphere and the methods of forecasting. Because information regarding the upper atmosphere was meager, the students did a considerable amount of research in order to improve the methods of making weather balloon observations.

The course differed radically from the regular Ground School but, with few exceptions, all student aerographers first completed the Ground School course. Since the classes were small, they required little formal organization and hours devoted to different aspects of aerology were flexible. Eight graduates of this school made up the first detachment of trained aerologists sent in April 1918 to organize and operate aerographic departments at naval air stations overseas. Of the 55 men assigned to the school, 54 graduated. One of them later headed the U.S. Weather Bureau.

MIT

The Receiving Ship—Establishment of the Receiving Ship in March 1918 solved a problem that had plagued the program from the beginning. As early as September 1917, the commanding officer reported that half of a new Flight arrived two days before the orders reassigning the graduates of Flight A were received. Since this put 225 men on board for the 200 bunks available, the only thing the C.O. could do was to send the men of Flight A on leave—a solution not entirely displeasing to them. Difficulty in transferring men after completing the course persisted because transportation was not available on Saturdays, the normal arrival day for a new Flight.

Although these difficulties were overcome by the ingenuity, and even persistence, of the commanding officer, they were aggravated by steady growth of the student body. In February 1918, the commanding officer recommended that students be sent to the school two weeks in advance of their scheduled assignment to Ground School and be quartered in a separate building. During these two weeks, he proposed that the students be vaccinated, outfitted with uniforms and receive instruction in Navy regulations, customs and drill. This system, he suggested, would isolate new students and thus diminish the chance of spreading contagious disease. It would also put the students in better physical condition and give them a proper indoctrination into school procedure. The plan was duly approved.

The new school, with accommodations for 300 men, went into operation on March 18, 1918, under the command of Ltjg. S. W. Sargent. As it developed, the men were on board from two to six weeks.

Men of the Receiving Ship were organized into companies, Company One being senior and containing those men farthest along in their training. Every two weeks the senior company was graduated, assigned a class number and transferred to the Ground School. The school remained in existence until November 19, 1918, when the last men on board were transferred.

While the work of the prospective Naval Aviators was intensive, it was not without its lighter moments. There was after-hours activity in spite of rigid rule enforcement and there were attempts to add glamour to a drab uniform by wearing Sam Browne belts while on liberty, but these are not recorded in official files. The detachment included a number of well known collegiate and professional athletes and contests between classes and with outside organizations were generally meets of high order. There were also competitions of a more naval character, including races of naval cutters, wall-scaling contests and tugs of war which provided onlookers with good entertainment. The detachment also included men of some wealth and as a result took a prominent part in various Liberty Loan drives, notably the third and fourth, in which the men subscribed 529 and 687 thousand dollars respectively. These not only exceeded the assigned quotas several times but represented a pro rata subscription of better than 400 dollars.

Men on board at the Armistice were given a choice of completing their training or going on inactive duty at once. About 550 men chose to go home. Graduates of the last two classes were placed on inactive duty upon completion of the course and were not assigned to flight training. Class 34, the last to be assigned, was graduated on January 18, 1919. In all, 4,911 students were assigned to the detachment; of these, 3,622 were graduated.

Success is measured best by results. The school was the first of its kind established by the Navy and was the principal source from which a constant stream of trained men flowed out to give body and spirit to the force which carried Naval Aviation through its first test of strength. The strong support of the Massachusetts Institute of Technology and the willing cooperation of its staff contributed in no small measure to the growth and effectiveness of Naval Aviation in the first World War.

FLIGHT SONG

Flight "A", Flight "A", here at the Institute,
Studying aeronautics under Mac, our corking Lieut.,
And when we get to the Kiel Canal
We'll do the job up neat-
Oh, Hans, oh Fritz, there'll be no German Fleet.

-Ensign Donald McClellan, U.S.N.R.F.

who died in an airplane accident at Brest, France, early in 1918.

F. TRUBEE DAVISON
Founder of the First Yale Unit

The great aircraft force which was ultimately assembled in Europe had its beginnings with a small group of undergraduates

By Captain Paul Jayson, USNR

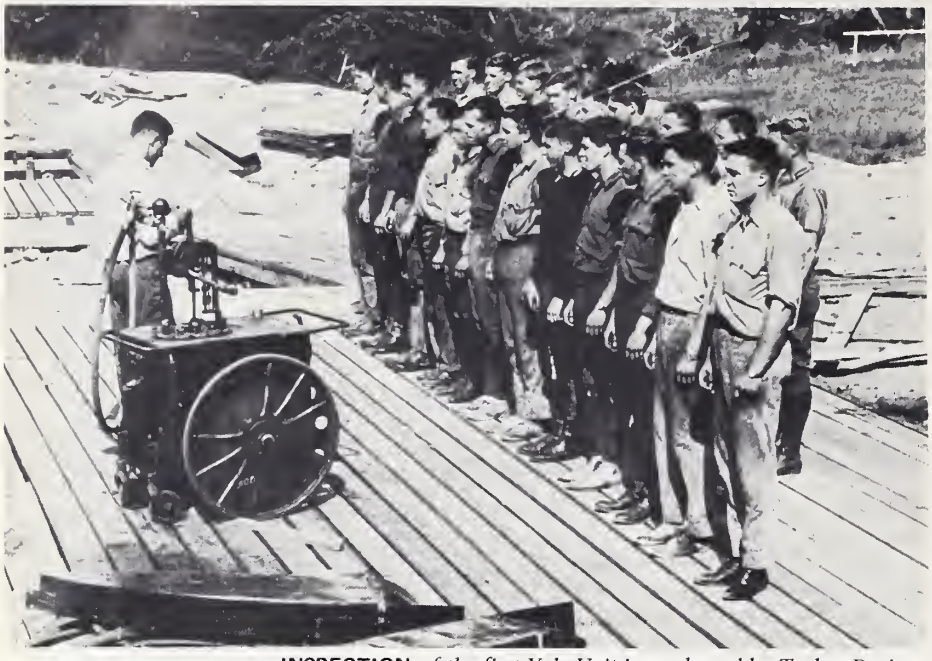
THE FIRST YALE UNIT

The Yale Unit flyers of World War I were the first unit of reserve pilots in the Navy. In that conflict, they served with distinction. The young man most responsible for the formation of the unit was F. Trubee Davison whose patriotism and can-do spirit put the Yale outfit into commission.

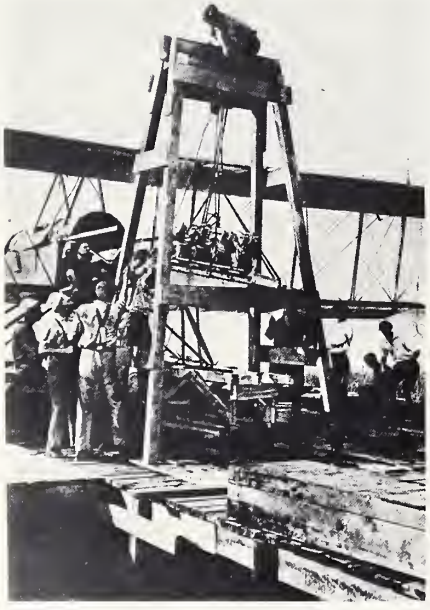
In 1966 the U.S. Navy paid its respects to Mr. Davison while celebrating the 50th Anniversary of the Naval Air Reserve. Vice Admiral Paul Ramsey, USN, then serving as Deputy Chief of Naval Operations (Air), presented him with a set of Navy Wings and designation as an honorary Naval Aviator. For Mr. Davison, retired since 1951 after 18 years as president of the Museum of Natural History in New York, the Wings became part of his Locust Valley, Long Island, memorabilia along with five college diplomas, Army and Navy commissioning papers, a citation for the Navy Cross and his Yale "Y" letter for crew.

It was his crew membership in June 1916 that started Davison, then a sophomore, on the road to organizing the men who were to be the first re-

THE FIRST YALE UNIT



INSPECTION *of the first Yale Unit is conducted by Trubee Davison at its training station, Huntington Beach, Long Island, New York. At right, the unit's Curtiss R-type, one of several seaplanes acquired by the group, is hauled up the facility's beaching ramp.*



FIRST *Yale Unit members hoist a 200-hp Curtiss V-2 engine. The group was later split up, some pilots becoming instructors at various stations, others going into combat. The Huntington experience provided good training for wartime activities.*

servists to become Naval Aviators. The Yale crew was in training on June 13, 1916, when President Woodrow Wilson ordered additional troops to the border to meet the threat of war with Mexico.

"It could never be said that the race with Harvard was forgotten," Davison recalled, "but it did lose magnitude as the prospect of war with Mexico loomed larger."

Several members of the crew had previously agreed that they would enter aviation, then a new Army and Navy service, if war came. The Navy had purchased its first airplane, the A-1, only five years earlier.

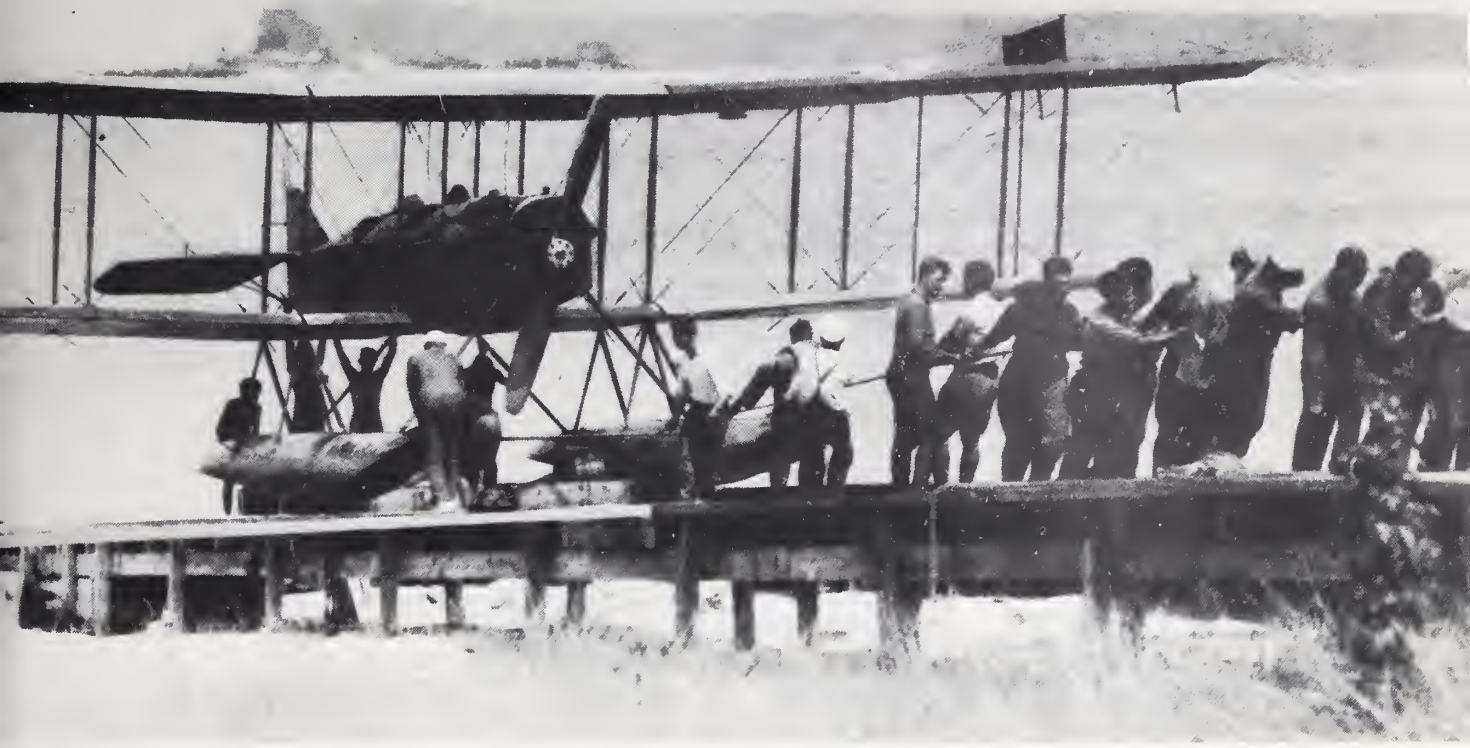
With fighting in Mexico imminent, Davison gathered together certain Yale undergraduates: Allan Ames, class of '18; Henry P. Davison, Jr., his brother, '20; John Farwell III, '18; Artemus L. Gates, '18; Erl Gould, '18; Robert A. Lovett, '18, Albert Sturtevant, '16; John Vorys, '18; and Yale graduate C. D. Wiman, '15. Two non-Yale men, Wellesley Laud-Brown and Albert Ditman, rounded out the first dozen of the Yale Unit.

Immediately upon being organized, they faced the problem of how they might learn to fly. Among the men consulted was John Hayes Hammond, Jr., the wireless inventor who was then Governor of the Aero Club of America. He referred the youths to Henry Woodhouse, an Aero Club member who, with Admiral Robert Peary, had formulated plans for the use of aircraft in war.

Woodhouse and Admiral Peary had proposed, among other things, that a series of air stations be established along the East Coast, each station having a certain territory to patrol, thus forming the coastal defense line. To form the nucleus for one of these stations, it was suggested that the Yale Unit men be trained as pilots of the first Aerial Coastal Patrol Unit.

Davison admits that the coastal defense idea was remote from the troubles with Mexico. "But the plan was essentially sound and during the World War I period was adopted by the Navy Department."

With willing students ready to fly, Davison still had problems finding airplanes and teachers for them. He



turned to Rodman Wanamaker, the New York and Philadelphia merchant, who was then operating a flying school at Port Washington, Long Island.

Wanamaker obliged by offering one Curtiss flying boat. With the airplane came one instructor, David McCulloch, who later served the Navy as copilot of the NC-3 on the famous trans-Atlantic seaplane flight. Thus equipped the Yale unit formed at Locust Valley that summer and began to learn to fly.

"If it had not been for the interest and enthusiasm of the pupils and their desire to labor in any way that could facilitate instruction, it would have been impossible to accomplish what we did that summer," Davison says.

Student pilots worked on engines, scrubbed down hulls and clambered over the airplane to keep it flying. At summer's end, four students had flown solo and the rest were ready for solo.

During the early fall, the students, still civilians but serving as members of the Aerial Coastal Patrol, took part in maneuvers off Sandy Hook with a fleet of battleships, destroyers and coastal patrol boats.

Davison points out that the use of airplanes was demonstrated in many ways: "First of all, it demonstrated the value of the airplane in locating hostile ships; secondly, it proved that mines could be located far more efficiently with seaplanes than by surface craft, and thirdly, it showed the Navy that civilians were not only interested in developing the aviation branch of naval warfare, but were devoting their time and energy to that end."

Still operating as a volunteer civilian group, the young men received that fall the donation of two seaplanes from friends and neighbors. One of the donors was Davison's father, H. P. Davison, then a partner in the J. P. Morgan financial firm.

To be nearer Yale during the fall semester, the unit moved its aircraft to the New London submarine base and flew from the Thames River until snow and ice forced a halt.

Additional members joined as 1917 arrived and conflict with Germany appeared inevitable. They included Yale men Charles Beach, '18; Graham Brush, '17; Reginald Coombe, '18; David Ingalls, '20; Robert Ireland, '18; Francis Lynch, '18; Kenneth MacLeish, '19; Archibald McIlwaine, '18; Curtis Read, '18; Russell Read, '20; William A. Rockefeller, '18; Kenneth Smith, '18; W. P. Thompson, '18; C. M. Stewart, '17; Samuel Walker, '17.

In March 1917, the unit transferred en masse to West Palm Beach, Fla., to take advantage of better weather. The transfer was made with a Navy lieutenant in charge, E. O. McDonnell, and all the members were enrolled in the Navy.

After returning to Long Island with Navy equipment added, the unit accelerated the business of training for war. As each trainee passed his flight tests, he became part of the rapidly growing Naval Aviation establishment.

After the United States declared war on Germany April 6, 1917, some went overseas to command air stations and some went to fight. Sturtevant was the first Naval Aviator to be brought down in combat. Ingalls became the Navy's first Ace. Many gave distinguished service as qualified instructors and administrators of the rapidly growing program at home and overseas.

THE FIRST YALE UNIT

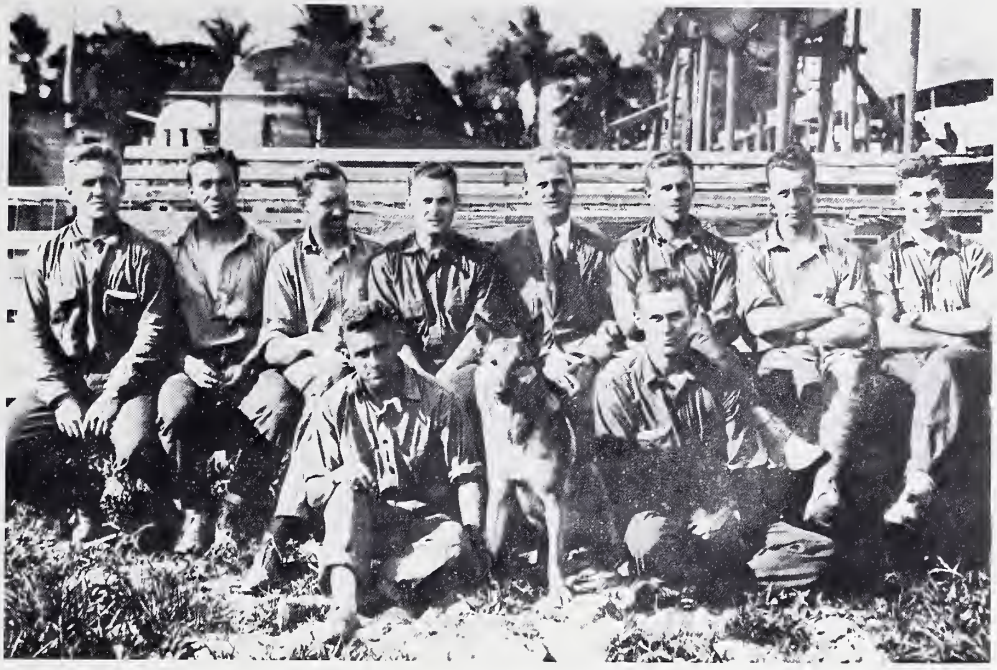
It was ironic that Davison was one of the few of the Yale unit who never earned his wings. He was injured in a crash on his final examination flight. He did, however, serve with distinction as a commissioned officer in the Navy.

In later years, various members distinguished themselves. Davison, for six years (late in the '20's and early '30's), served in Washington, D.C., as Assistant Secretary of War for Air, and another Yale Unit officer, David Ingalls, served in a parallel capacity in the Navy as Assistant Secretary of the Navy for Air (1929-32). In WW II, the Yale Unit alumni were again in the forefront of aviation: Robert Lovett as Assistant Secretary of War for Air and Artemus Gates in the same capacity for Navy (September 1941 to July 1945). Later, from 1951 to 1953, Lovett was Secretary of Defense. Another member entered the political arena, John Vorys, and served four terms as a Congressman from Ohio.

"Send for the Yale Gang!"

In describing our sub-chasers, I have already paid tribute to the splendid qualities of reserve officers; and our indebtedness to this type of citizen was equally great in the aviation service. I can pay no finer tribute to American youth than to say that the great aircraft force which was ultimately assembled in Europe had its beginnings in a small group of undergraduates at Yale University. In recommending Mr. Trubee Davison for a Distinguished Service Medal, the commander of our aviation forces wrote: "This officer was responsible for the organization for the first Yale aviation unit of twenty-nine aviators who were later enrolled in the Naval Reserve Flying Corps. This group of aviators formed the nucleus of the first Naval Reserve Flying Corps, and, in fact, may be considered as the nucleus from which the U.S. Aviation Forces, Foreign Service, later grew."

This group of college boys acted entirely on their own initiative. While the United States was still at peace, encouraged only by their own parents and a few friends, they took up the study of aviation. It was their conviction that the United States would certainly get



SOME OF THE *first Yale Unit, from left to right, back row: John M. Vorys, Artemus L. Gates, Albert J. Ditman, Allan W. Ames, David H. McCulloch, F. Trubee Davison, Robert A. Lovett and Erl C. B. Gould; front row: Wellesby Laud-Brown, "Ella" and Henry P. Davison.*

into the war, and they selected this branch as the one in which they could render greatest service to their country. These young men worked all through the summer of 1916 at Port Washington, Long Island, learning how to fly; at this time they were an entirely unofficial body, paying their own expenses. Ultimately the unit comprised about twenty men; they kept constantly at work, even after college opened up in the fall of 1916, and when war broke out they were prepared – for they had actually learned to fly. When the submarine scares disturbed the Atlantic seaboard in the early months of the war, these Yale undergraduates were sent by the department scouting over Long Island Sound and other places looking for the imaginary Germans.

In February 1917, Secretary Daniels recognized their work by making Davison a member of the Committee on Aeronautics; in March practically every member of the unit was enrolled in the aviation service; and their names appear among the first one hundred aviators enrolled in the Navy – a list that ultimately included several thousand. So proficient had these undergraduates become that they were used as a nucleus to train our aircraft forces; they were impressed as instructors at Buffalo, Bayshore, Hampton Roads, the Massachusetts Institute of Technology, Key West and Morehead. They began to go abroad in the summer of 1917, and they were employed as instructors in schools in France and England. These young men not only rendered great material service, but they manifested an enthusiasm, an earnestness, and a tireless vigilance which exerted a wonderful influence in strengthening the morale of the whole aviation department. "I knew that whenever we had a member of that Yale unit," says Lieutenant-Commander Edwards, who was aide for aviation at the London headquarters in the latter part of the war, "everything was all right. Whenever the French and English asked us to send a couple of our crack men to reinforce a squadron, I would say, 'Let's get some of the Yale gang.' We never made a mistake when we did this."

—*The Victory at Sea* by Rear Admiral William S. Sims

TWENTY-ONE *of the 24-man contingent: Front row: Frothingham, Butler, Wright, Swift, Warburton; middle row: Zunino, Randolph, Mudge, Gordon, Read, Breckenridge, Matter; back row: Forrestal, Shea, Goldthwaite, Chapman, McCoid, Halstead, Tenney, Clarkson, McCann.*

TRAINED BY THE ROYAL FLYING CORPS

By J. Sterling Halstead
Naval Aviator No. 160

AN INTELLIGENCE mission* could hardly have departed with less fanfare. Only the gold braid on the naval officers' caps was conspicuous, although the naval khaki uniforms looked a bit like Theodore Roosevelt's "Rough Riders." They came through Boston's old North Station singly and in groups of two or three and disappeared into the semi-darkness of the train shed outside.

Mostly strangers to each other, the 24 men found their billets in the last car of the Montreal Express. So began the mission of the group that later came to be known in United States Naval Aviation as the "Canadians."

We had expected to go to NAS SQUANTUM, Mass., but instead we had been ordered to active duty with the Royal Flying Corps at Toronto.

The detachment was made up of 11 Princetonians: Gavin Breckenridge, William F. Clarkson, James V. Forrestal, Harold F. Gibson, Harry B. Gordon, Robert Matter, Richard H. McCann, William F. Mudge, Edward L. Shea, William J. Warburton and Frank A. Zunino. The two ensigns in command, Frederick S. Allen and Francis I. Amory, were from Harvard as were Duval R. Goldthwaite, Paul S. McCoid and Duncan H. Read. I was a 1916 graduate of Yale and had entered Harvard Law School. Philip B. Frothingham was from Dartmouth and Stuart M. Butler, Thomas H. Chapman, Arthur H. Wright, Rettig A. Griswold, Henry Swift and Robert D. Randolph had college affiliations which I do not recall.

The first time we assembled at the University of Toronto parade ground for drill, the Commandant of the Ground School greeted us and asked whether we had among us anyone who could instruct us in drill. Our replies being negative, Sgt. Sedgewick, a typical Rudyard Kipling soldier from the Coldstream Guards, was appointed our drill master.

We were told to take notes on everything so that we could bring back to the U.S. Navy complete information on the subjects taught, the equipment and the methods used. The first day, however, all we took back to our barracks were very sore feet and very tired muscles.

After two weeks of putting in long hours on the parade ground—four to six hours a day—we were all in wonderful shape. We finished our training with a lasting affection for Sgt. Sedgewick.

* Under the title of "A Mission to the Royal Flying Corps," J. Sterling Halstead, Naval Aviator No. 160, wrote for the U.S. Naval Institute Proceedings, February, 1965, pp. 78-94, a detailed account of the training in 1917 of young candidates for Naval Aviation Wings. This article describing training in Canada is a précis of that account. The pictures are taken from the collection of Harold F. Gibson, Naval Aviator No. 156.

The drilling and ground school lectures and classes crowded our days through July and August. We were taught theory of flight, rigging, engines, machine gunnery, bombing, aerial photography, meteorology, instruments and astronomy. We listened with rapt attention to Canadian and British officers with combat or front line experience.

We were thoroughly schooled in the Lewis and Vickers machine guns by noncommissioned officers. We learned to live with the guns, to break down and reassemble them at top speed, to clean them and to recognize and correct various types of jams to which they were subject. We came to understand the workings of the various types of aerial gunsights then in use, but our firing experience was deferred until we reached the advanced flying school in October.

"Artillery Observation" was the now well-known system of reporting and directing artillery fire by "wireless," as the RFC called it, from the air. In the ground school, the cadets had the benefit of a mock-up of a landscape showing a battlefield with a seat for the pilot hung high above and fitted with a sending key. A system of lights on the map below simulated the results of artillery fire. The spot, where each shot "struck," was reported by wireless key and checked by the instructor.

In the engines class, we examined and, in some cases, took apart and reassembled various types of aeroplane engines, including the English Daimler, the American Curtiss, used in training airplanes in Canada, and the French Clerget and *Gnome* rotary. Our lectures covered the design, material and working of the carburetor and magneto, the timing of engines, theory and practice.

In the class in rigging, we learned in detail how aeroplanes were constructed from specimens of wings from planes that had crashed. We learned to mend the holes in fabric, by sewing, patching, and then painting with aeroplane varnish.

The theoretical side of flying was presented in lectures. We learned why an aeroplane flew and how it was controlled, plus a glossary of new terms. The classes in bombing, aerial reconnaissance, contact patrol and map reading were all closely related to operations on the Western Front.

Our only recreation during this period was to walk downtown in Toronto after our work day was over. The city was full of men in uniform, many of them RFC cadets as well as Canadian ground troops. The spectacular officer's uniform was notably missing, however; the officers were allowed to wear mufti when off duty to avoid constant saluting.

Our naval officers' caps brought us immediate attention. We were tagged the "American Naivy" by the British soldiers and the name stuck to us until we returned home.

One effect of our evening ramblings was to convince us that we were badly dressed compared to the RFC cadets. Our officers had tried without success to get some information from Washington about our own winter naval aviation uniforms. We decided to do something about the situation ourselves. The prime mover in obtaining uniforms was Jack Warburton of Princeton, a member of the Wanamaker Clan.

The name of the tailor selected, as I recall, was "Follet & Sons." The uniforms were of green gabardine, as the Navy had indicated that the naval aviation winter uniform was to be green like that of the Marines. As several of us had tried to have our khaki summer uniforms copied with strikingly unsatisfactory results, we were forced to decide on the British jacket or "tunic" as they called it, with a flaring skirt and belt. The belt did not have the shoulder strap like the Sam Browne belt but we added that just before leaving Canada. With the naval officer's hats equipped with green gabardine tops, our outfit might have passed for "Florenz Ziegfeld Aviators."

Our uniforms were finished just before the end of August, when we had expected to be leaving for flying camp. But there was not room for us at any flying camp, so we were sent to Longbranch on the lake shore some miles southwest of Toronto where we were quartered in tents. We stayed there only a week. Soon we were again on a train, bound for a flying camp in eastern Ontario at Deseronto, about 40 miles from Kingston.

Upon arrival, we stood on the station platform awaiting orders. Aeroplanes were coming and going overhead, motors roaring and wings flashing in the sunlight as they banked and turned. It was a new and fascinating world. Upon arriving at Camp Rathburn, we wandered down to the hangars and spent the greater part of the afternoon watching flying operations. Some of the Canadian officers began taking us up on what was known as our "joy hop."

After taking off and climbing well above the field, the RFC pilots would make a few sharp banks, standing the ship first on one wing and then the other, then turn back to the aerodrome, coming in for a landing in a steep dive. It was over almost before we knew it had happened. I staggered away toward the hangar a little dizzy after my flight. Nearly three weeks passed before we were off the ground and in the air again.

There was always a shortage of aeroplanes, owing to crashes which in many cases did not injure the pilot but always put the aeroplane out of use for a minimum of several hours. This shortage was aggravated by the fact that, after soloing, student pilots were allowed to wander all over eastern Canada and sometimes landed so far away from camp that it took several days to truck the plane back.

One of the Canadian cadets, a stocky little American from Louisiana named Winkler, was ordered by an 18-year-old British lieutenant to take a plane up and stay three hours. He attempted to do just that. We had all been instructed that gas tanks in Curtiss trainers held only enough for two and a half hours' flying. Winkler somehow managed to stay up three hours and five minutes, then made a forced landing in a field full of boulders without even blowing a tire. To compound the errors, however, the "leftenant" took off with Ed Shea in the front seat and flew over to survey the situation. When he attempted to land, he hit a boulder with one wing. The crash gave Ed some minor cuts and bruises. Both aeroplanes had to be dismantled and trucked back to camp, a process which took days.

Instructors were finally assigned to us and our flight training began. When my instructor, Lt. Goldstein, indicated that he thought I was ready to solo, he was more confident than I was. That night a black cat crossed my path and, for the first time in my life, I was disturbed by it. But the insignia of our squadron was a black cat and

apparently both of them were good luck because I soloed without mishap.

On the first solo flight, our cadets experienced a sort of monotony of tension. This was described by Randolph after his flight, "I sat up there for two hours waiting for the tail to fall off." There were many things we knew could happen but they never did.

Of course, we had our share of crashes: Tom Chapman managed to land nose first, but with tail almost perpendicular, on top of one of the hangars. He was not even scratched. Getting him down without upsetting the aeroplane on top of him, however, was a precarious job.

Jim Forrestal, who was both capable and careful, at first found it exceedingly difficult to make landings. He broke the back of one plane, demolished the undercarriage of another, and spoiled a third, fortunately without any injury to himself. After that, he had no further difficulty.

We had to learn to fly entirely by "feel" as we had no instruments except an altimeter and a "rev counter" showing the speed of the motor. We learned by watching and following the instructor's use of the controls. The members of our unit soloed after periods of dual instruction that ran from a maximum of six hours to a minimum of 45 minutes compared with the ten hours dual then required in the flying schools of the U.S. Army and Navy.

Fortunately, even the worst crash that any of us had did not result in an injury. One afternoon during our last week at Deseronto, an aeroplane came in just over the tree tops. We expected the pilot to land (though he was coming in crosswind) because one wing was drooping and the motor was missing badly. Instead, he made an uncertain turn off the field, flew over a barn, missed a silo by a few feet and disappeared. A quick check showed that the pilot was Floyd Clarkson.

Again Clarkie came in, executing the same maneuver in an even more shaky fashion. This time, however, he did not return and the sound of his motor died out quickly beyond the trees. At this point the black ambulance which we called "Hungry Liz" dashed down the road. None of us expected to see Clarkie alive.

An agonizing hour passed. Then up came "Hungry Liz" and out stepped Clarkie unscratched, looking for all the world as if he had been to Eternity and back. He had ended his strange flight in a flat tailspin which caused the aeroplane to collapse into kindling wood as it struck, leaving the pilot unhurt in the middle of the pile.

GORDON *and Read, Naval Aviators 151 and 145, model two types of uniforms they wore.*

One day we had word that we were expected at the Camp Borden Advanced Flying School on October 1. It was also rumored that if we finished our requisite 50 landings and ten hours of solo time sooner, we would be granted leave to go home in the meantime. Since I needed only four hours to finish, I decided to get them out of the way at once. I easily put in two hours in the morning, but in the afternoon, I found that the only aeroplane was a new Canadian Curtiss JN4, then in the process of being assembled. By four o'clock, I obtained permission to take it up.

It was a wonderful little aeroplane and extremely pleasant to fly compared with the somewhat exhausted JN4B's we had been using. I turned east along the lake for a while, then north, and then headed for camp. After several of these laps, I noticed the sun was getting low over the horizon. On one pass, I saw the lights coming on at camp and in Deseronto, but the sky was still light.

Watching the night come on was so engrossing that I overlooked the significance of what I was seeing. Suddenly the light in the west vanished and darkness crowded in. I was several miles east and north of the camp when, without warning, my engine, which was new and stiff, sputtered once and stopped dead. I must have been about 1,000 feet above the trees.

There was no time to think. From some newborn instinct, I pushed the nose of the aeroplane over into a steep dive. The treetops were coming up faster when, miraculously, the motor started. The air pressure on the propeller generated by the dive had cranked the engine.

I headed for camp, circled once and, seeing a motor lorry with its headlights showing up a few yards of grass on the field, was able to land with no trouble at all. It was just six o'clock. I had completed my ten hours and was ready for leave.

When I returned, our unit was sent north by train into the Georgian Bay and Lake Simcoe country to the advanced flying school.

THE WEATHER was always cold and windy during our stay at Camp Borden. On some days, it blew so hard that the underpowered Curtiss training aeroplanes were badly tossed about. We were constantly on the edge of trouble in turns at low altitudes near the aerodrome and in making landings, avoiding sideslips and spins.

On one of the first flights I made at Camp Borden, coming back to the field, I nosed over a few miles from camp to lose altitude from 2,000 feet. The aeroplane, which was rigged nose heavy, dropped out from under me so quickly in an almost perpendicular dive that I had the sensation of falling at lightning speed minus an aeroplane.

On another occasion, McCoid and I were slated to fly to Toronto 70 miles away. A strong wind was blowing, and when I took the aeroplane assigned to me up to try the air, the wind nearly turned it over. Much to the displeasure of our Canadian Flight Commander, I concluded it was too rough to make the trip that day.

McCoid took off after a time but had to make a forced landing near Lake Simcoe, far off the course to Toronto. He did not get back to camp for two days. A Canadian cadet took my plane and crashed so badly that he lost the sight of both eyes.

The threat of a forced landing was the hazard most constantly present in our minds at Borden as it had been in Deseronto. At Borden, however, the course included some preparation for such a contingency. We were required

to make landings in a 50-foot circle, cutting the motor at a stated altitude, and our performance was checked by our Flight Commander. Whenever a cadet was in the air and had the opportunity, he was apt to hunt for a spot to try such a landing. It was good practice and, besides, landing in a farmer's field had an attraction approximating an appearance in a circus parade.

Some daily flying was devoted to formation, but this was largely a gesture; some, to climbing for the altitude test, 8,000 feet. The hazard of the latter was that the JN4 sometimes stalled as it approached that height, and as none of us was given training in stalls or in spins which might follow, those cadets who experienced either were apt to do the wrong thing. So far as I can remember, the only remedy given us for a spin was reverse rudder and aileron, which did not agree with the theory later taught us by the U.S. Navy—to put the controls in neutral. I recalled this argument in the spring of 1918 as I spun a Navy Burgess seaplane into San Diego Bay.

The remainder of the 40 hours flying required to finish the course was devoted to bombing practice, artillery observation and aerial gunnery.

Bombing was the easiest. The RFC had a ground support device consisting chiefly of a mirror in which the bombing plane was reflected. The bombing pilot sent down a "wireless" signal in lieu of releasing a bomb and the enlisted man watching the mirror could determine from the position of the reflection of the aeroplane whether the bomb would have hit the target.

Artillery observation consisted of flying figure 8's over a tent several miles from camp and reporting the location of puffs from small smoke bombs previously laid out and fired by an enlisted man. The report by the pilot was sent by wireless in the now well known "clock code." As the Curtiss JN4 had no compass, confusion was easy.

Aerial gunnery training on flexibly mounted Lewis guns was given to pilots riding in the training aircraft as passengers along with cadets being trained as observers. The Canadian pilots flying these gunnery hops were volunteers, probably because it was regarded as a suicide profession. Two pilots would often put themselves into difficulties by maneuvering their planes in simulated combat. A camera device, which took a single still picture when "fired," produced a print showing whether the gunner's aim would have scored a hit.

The other part of aerial gunnery training, actual firing at a sleeve target towed by another aeroplane, was carried out with Lewis guns on flexible mounts bolted to the top wing of the gunnery plane. The cadet fired from a standing position in the rear cockpit. The pilot of the tow plane crossed the flight of the training plane at a right angle and sufficiently ahead to give a clear chance for a burst of fire at the sleeve target without the tow plane coming into the line of fire. This could be hazardous.

No safety belts were provided for the cadet, so that as soon as I spotted the target approaching from the right, I stood up in the rear cockpit and started firing. It was a long reach, lengthening as the target got further away. Without intending any gymnastics, I climbed up until I was standing on the rear seat. As I followed the target, suddenly the towing ship and its pilot appeared in the middle of my ring-sight and I found my gun aimed point blank at his tail. Fortunately nothing happened, and I hastily turned my gun away and slid back into the seat. That night I expected at least there would be rumors of bullet holes in the towing ship, but I heard none.

Just before we finished the course at Borden, Ens. Fred Allen told us that we were going to be instructors in the U.S. Navy's flying schools. At the end we wrote reports on various phases of our training.

'PETE' GIBSON *with favored leather helmet over steel lining; note black cat insignia.*

It was still October when we returned to the Boston Navy Yard. The brass on our hats and the bright green of our uniforms seemed to look brighter and more conspicuous in the autumn sunshine of Boston. As we swung by the Marine sentry at the gate, with clicking heels and our Sam Browne belts and British open-collared tunics, we heard a bystander remark that we were a detachment of the Italian Navy.

At the door of the building where we had received our orders in July, we halted and broke ranks never to form again. But the mission was not ended. A new and far more important phase was soon to begin.

TOWARD the end of November, our commissions and orders came through. We were divided between Bay Shore and Hampton Roads Naval Air Stations to qualify on seaplanes and flying boats, which required only a few days, and then we were scattered.

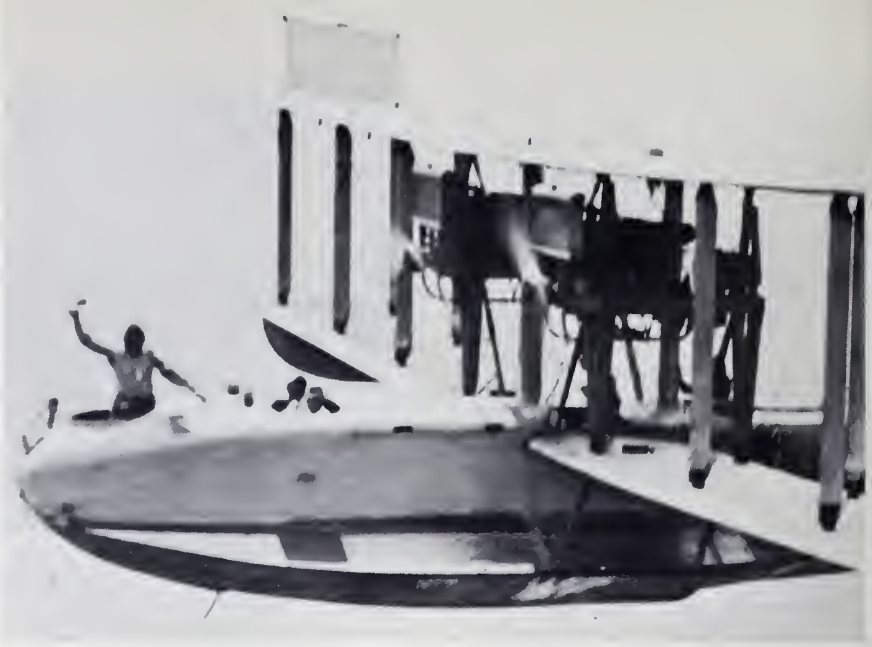
The largest contingent from Bay Shore, including Allen, Gibson, Gordon, Clarkson, Swift and others, went to Pensacola where they developed an advanced flying and aerial gunnery school patterned after Camp Borden. Duncan Read was soon sent to Miami and remained in command there until the Armistice.

Breckenridge, Butler, Frothingham, McCann and Wright were sent to stations in England and France; Frothingham and Wright never returned. Ed Shea and I were ordered to San Diego, Calif., where, with Ensigns A. K. Warren and Bert Ames, Naval Aviators trained at Pensacola, we joined with LCdr. E. Winfield Spencer, then commanding officer of an air mechanics school located in Balboa Park, in founding NAS NORTH ISLAND. Our only other claim to distinction from that duty was the privilege which we enjoyed of dancing once on Saturday nights, at the Hotel del Coronado, with the C.O.'s wife, now the Duchess of Windsor.

Jim Forrestal, with Goldthwaite, was sent to the Navy Department in Washington to help in the task of spreading the lessons learned and the material brought back from Canada. There he worked under the Assistant Secretary of the Navy, Franklin D. Roosevelt, who, years later, would appoint Jim his Secretary of the Navy.

Pigeons...

829 trained pigeons flew 10,995 missions with Navy pilots, but carried only 230 messages from the planes – 219 successfully, with 11 messengers missing in action.

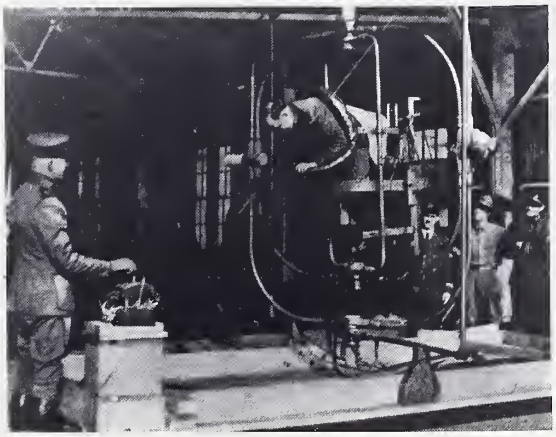


PIGEON-PITCHING FROM AN F5L

A U.S.-BRED *pigeon paced World War I birds with a record-setting 196 messages delivered from sea during the last year of the war. But the Navy's first carrier pigeons were of Belgian, French and British origin, obtained in a 1917-18 "lendlease" deal. "Peerless Pilot," shown in profile at upper left, was the record holder, bred at U.S. NAS Pauillac. Pilots were taught to throw the birds up or down to avoid props, depending upon the aircraft model, while the British tossed their birds in bags in order to minimize feather damage. Naval Air maintained 12 pigeon stations in France with 1,508 trained, young and in-training birds on hand at the time of the Armistice. On the cover, the white speck is a messenger leaving an HS-2 seaplane over the submarine-infested Bay of Biscay.*

...and Pilot Trainers

Gimbal-mounted orientators could provide the novice with sensations of flight variously described as "sailing, dipping, zooming and looping the loop." Photos show fledgings being whirled about in all directions in the specially designed frames.



THREE MORE MONTHS: JULY, AUGUST, SEPTEMBER, 1917

In the second three months of WW I, the expansion program got underway. Although there was some evidence that those directing the expansion were profiting by the experience of our Allies across the ocean, their initial moves were both bold and imaginative in comparison with what had been done in aviation prior to our entry in the war. It was too early to see the results of their work or, in fact, how great the expansion would be, but the foundation laid in these months proved solid and sound for the growth that was to come.

JULY

4—The first eight-cylinder Liberty motor arrived in Washington, D.C., for test by the Bureau of Standards. It had been assembled at the Packard Motor Car Company from parts made by manufacturers in plants scattered from Philadelphia, Pa., to Berkeley, Calif. Design, manufacture, and assembly of this motor had taken less than six weeks.

9—Twenty-four potential Naval Aviators, with Ens. Frederick S. Allen as officer-in-charge, reported at the University of Toronto to start flight training under the Canadian Royal Flying Corps. Many of the group were from the Princeton Unit which had been in training at East Greenwich, R.I., while awaiting call to active duty.

10—A proposed system of training student officers of the Naval Reserve Flying Corps, which represented a radical change from the existing system, was circulated for comment. The program consisted of three parts: (*1*) a Ground School for indoctrination into the Navy and study of subjects related to aircraft and flight, (*2*) a Preliminary Flight School for flight training through five to ten hours of solo, and (*3*) a Completing Flight School for advanced flight training and qualification as a Naval Aviator and commission as Ensign, USNRF.

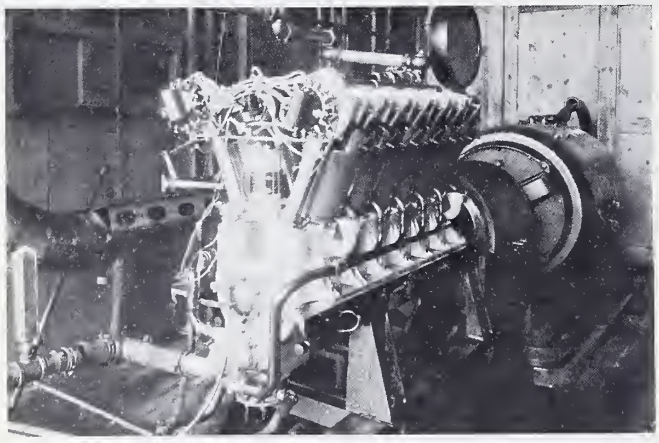
23—The ground school at the Massachusetts Institute of Technology went into operation with the arrival of the first commanding officer, Ltjg. Edward H. McKitterick, and a group of 50 men comprising the first class (see NANEWS, August 1967, pages 24-27). In this and in supplementary programs later established at the University of Washington in Seattle and at Dunwoody Institute in Minneapolis, large numbers of prospective aviators and ground officers were indoctrinated into the service and introduced to the fundamentals of aviation.

24—A large obstacle to the effective expansion of aircraft production was removed by the formation of the Manufacturers Aircraft Association to handle the business of cross-licensing patents between all aircraft manufacturers in the United States.

26—The Army-Navy Airship Board considered a proposal by the Bureau of Mines that the experimental production of helium be undertaken and, in its approval, recommended the allotment of $100,000 to construct a small plant for the purpose. This action, subsequently approved by both Departments, was the beginning of the helium production program in the United States.

27—An Act of Congress authorized the President to take possession of North Island so that the Army and Navy could establish permanent aviation stations and schools. The arrival of Lt. Earle W. Spencer on 8 November 1917, under orders to establish and command a station for the purpose of training pilots and mechanics and maintaining coastal patrol, marked the beginning of the present Naval Air Station, North Island.

27—Construction of a Naval Aircraft Factory at the Philadelphia Navy Yard was authorized for purposes of constructing aircraft, undertaking aeronautical development, and providing aircraft construction cost data.



DYNAMOMETER TEST OF LIBERTY ENGINE, PACKARD COMPANY, 1918

SIGNAL FACILITY AT MOUTCHIC, A TRAINING STATION IN FRANCE

BY DECEMBER 1917, LTA FACILITIES HAD BEEN ADDED TO MONTAUK WHICH HAD BEEN COMMISSIONED AS A SEAPLANE PATROL STATION

AUGUST

8—The Secretary of the Navy approved the plans to establish one training and three coastal patrol stations in France, the first of several plans dealing with an overseas base construction program. This program was successively expanded and it ultimately provided 27 locations in France, England, Ireland and Italy from which naval air units were operating at the close of the war.

10—Ground was broken for building the Naval Aircraft Factory at the Philadelphia Navy Yard.

14—In a test conducted by Lt. Edward O. McDonnell at Huntington Bay, L.I., a torpedo was launched from a seaplane. It struck the water at a bad angle and ricocheted, nearly striking the plane. This test marked the beginning of serious Navy interest in launching torpedoes from aircraft. Later tests were made at Philadelphia.

16—The first students of the First Aeronautic Detachment to complete the flight course at Tours transferred to Lake Hourtin to begin training in F.B.A. flying boats.

25—Development of flying boats, later designated NC, was initiated by Chief Constructor David W. Taylor in a memo which outlined the general requirements of an airplane needed in war and directed his staff to make further investigation. Taylor stated in part: "The 'United States [Liberty] Motor' gives good promise of success, and if we can push ahead on the airplane end, it seems to me the submarine menace could be abated, even if not destroyed, from the air. The ideal solution would be big flying boats, or the equivalent, that would be able to fly across the Atlantic to avoid difficulties of delivery, etc."

25—The 12-cylinder Liberty motor passed a 50-hour test with a power output of 301 to 320 horsepower, preliminary to being ordered into mass production.

31—NAS Moutchic, established as a flight and ground training station in France, was commissioned under command of Lt. John L. Callan.

In August 1917, NAS Montauk was commissioned with Lt. Marc A. Mitscher in command. Operated initially as a seaplane patrol station, facilities were later expanded to include lighter-than-air operations.

SEPTEMBER

7—In tests which led to additional orders for Simon radio transmitters, radio signals sent from an R-6 seaplane flying at Pensacola were received loud and clear by Naval Radio Station, New Orleans, over 140 miles away.

7—A forest green winter service flying uniform, of the same design as the summer uniform, was authorized for all officers detailed to aviation duty.

7—A winged, foul anchor was adopted as an official device to be worn on the left breast by all qualified Naval Aviators. Before the wings were issued, use of the letters U.S., which had been incorporated in the first design, was abandoned and the design adopted was essentially that of the wings worn by Naval Aviators today. Adoption of wings appears to have been responsible for compiling, in January 1918, the first precedence list of Naval Aviators, at that time numbering 284.

8—A site at the Naval Operating Base, Hampton Roads, was established as an air training station and patrol base and as a center for experimental work in seaplane operation. Detachments under training at the Curtiss School at Newport News and others at Squantum transferred to this location in October and, on 27 August of the next year, the Naval Air Station was placed in commission, LCdr. P.N.L. Bellinger commanding.

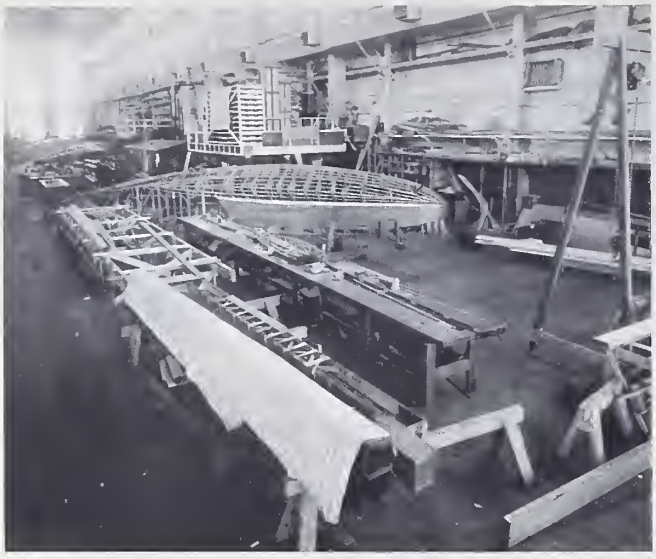
17—A kite balloon from USS *Huntington* was hit by a squall. While it was being hauled down to the ship, it struck the water so hard that the observer, Ltjg. H. W. Hoyt, was knocked out of the basket and entangled in the lines. As the balloon was pulled toward the ship, SF2 Patrick McGunigal went over the side, cleared the tangle and put a line around Lt. Hoyt so that he could be hauled up on deck. For this act of heroism, McGunigal was later awarded the Medal of Honor.

17—The Secretary of the Navy approved establishment of 15 naval air stations overseas to be in operation by 1 July 1918, each to be equipped for seaplane operations. Five of them were to have, in addition, facilities for operating airships and supporting kite balloon operations.

18—A production program of 1,700 operational type aircraft was established on the basis of a report issued this date by the Joint Technical Board of Aircraft.

26—Lt. Louis H. Maxfield, commanding the Naval Air Detachment at Akron, Ohio, reported the qualification of 11 students, including himself, as lighter-than-air pilots and requested their designation as Naval Aviators (Dirigibles). These men, the first trained specifically as dirigible pilots, were subsequently assigned Naval Aviator numbers ranging from 94 to 104.

27—Ens. Robert A. Lovett (later SecDef) made the first flight at NAS Moutchic, France, in an F.B.A. seaplane, the assembly of which had been under his direction.



THE EXPERIMENTAL SHOP IN THE LAST SIX MONTHS OF THE WAR

THE PROPELLER SHOP OCCUPIED A LARGE SECTION OF THE PLANT

THE NAVY BUILDS AN AIRCRAFT FACTORY

Aircraft, bases and men were the three keys to success in the wartime expansion of Naval Aviation. Base construction, which began within a month of the declaration of war, would soon provide a network of stations to support operations on both sides of the Atlantic. Provisions for training large numbers of officers and men had been made and would shortly produce the much needed qualified personnel. Only the aircraft procurement problem remained. The prospect that needs would quickly outstrip the existing manufacturing potential made the situation urgent.

By Izetta Winter Robb

ONE OF THE NOTABLE achievements of Naval Aviation in World War One was the establishment of the Naval Aircraft Factory at Philadelphia.

Shortly after the United States entered the war in 1917, the Navy found it feasible to construct and put into operation its own aircraft factory. It appeared unlikely that existing aircraft plants in the country would be able to cope with the large orders being thrown upon them by the Army and the Navy. It seemed wise to the Navy, therefore, to consider building at once an aircraft factory under Navy ownership.

The Navy had three objectives in establishing such a plant: to manufacture at least a part of Navy aircraft under the direction and control of the Navy Department; to have a plant in which aircraft could be designed and developed under the close direction and supervision of the Navy Department and its bureaus; and to accumulate data by which the Navy could be guided in dealing with questions of cost arising out of contracts with privately owned aircraft factories.

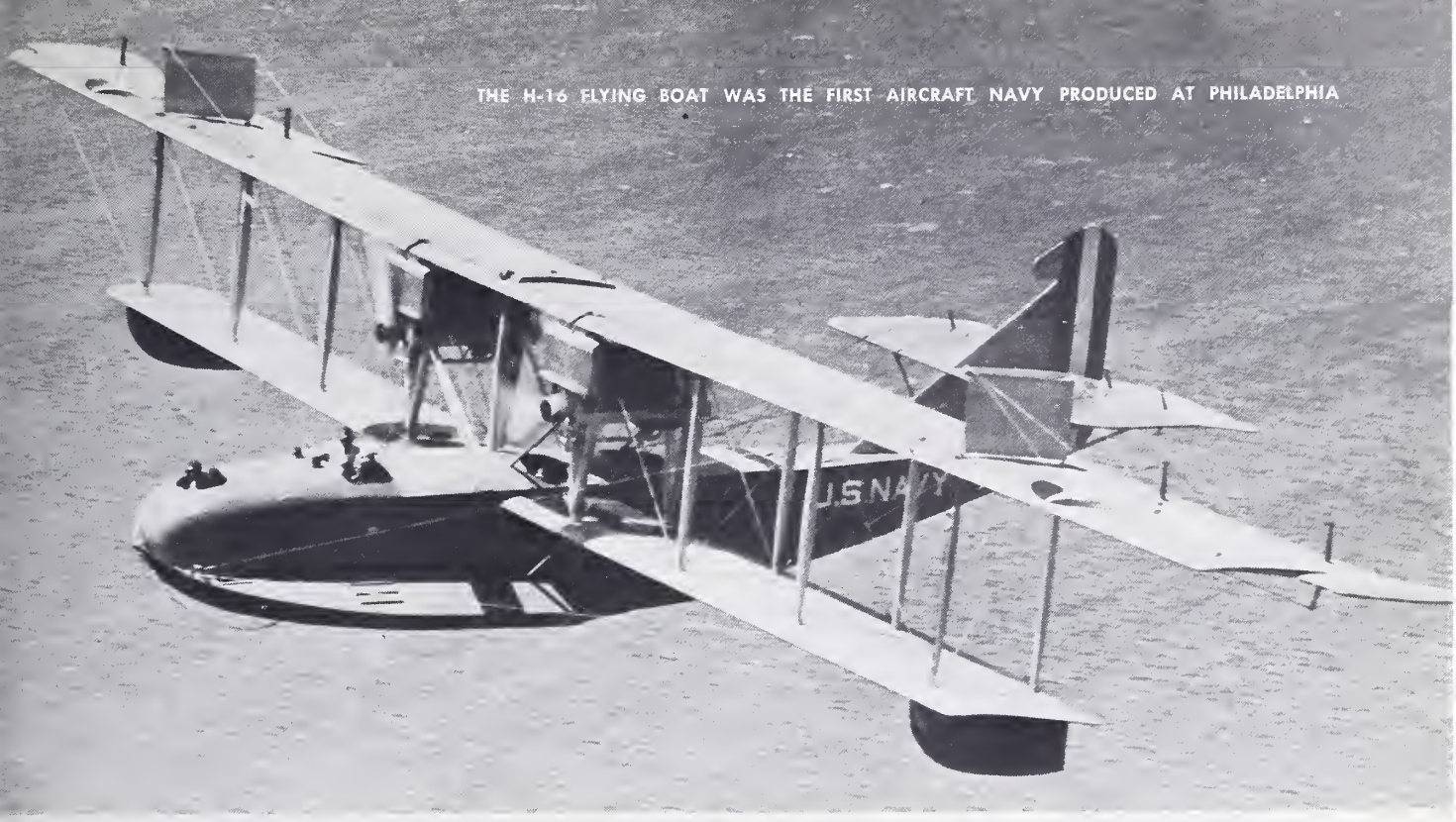
In June 1917, therefore, the Navy Department directed Commander F. G. Coburn, USN, Construction Corps, to make a survey of the situation and report upon a suitable location for, size of, and cost of a naval aircraft factory which would be capable of producing 1,000 training seaplanes a year or their equivalent. Commander Coburn visited various private plants in the country and made a detailed study of the Curtiss Company plant in Buffalo, at that time the only factory in the country that could be considered a quantity-producing plant for airplanes.

Upon completing the tour, Commander Coburn, with Naval Constructor L. M. Henry, wrote a report entitled, "Proposed Naval Aircraft Factory." This report, meeting with the approval of the head of the Bureau of Construction and Repair, David W. Taylor (for whom the Model Basin at Carderock, Md., was named), was forwarded July 10 to SecNav, bearing Chief Constructor Taylor's endorsement — and recommendation.

On July 27, Secretary of the Navy Josephus Daniels, acting upon the recommendation, approved the project, estimating the cost at $1,000,000. The Philadelphia Navy Yard was selected for the new venture since ample land was available there and the location was advantageous in terms of labor, material and transportation. Furthermore, the Delaware River offered a natural facility for testing seaplanes.

Construction was to include a main building for the factory proper and three auxiliary buildings—a dry kiln, dry lumber storehouse, and boiler house. Commander Coburn estimated the minimum time required to put the factory into operation at 100 days.

Believing as SecNav so succinctly (and prophetically) put it in his 1918 Annual Report that "aircraft [had] come to stay," the Navy built the new factory as a permanent structure. A temporary one would have cost very



THE H-16 FLYING BOAT WAS THE FIRST AIRCRAFT NAVY PRODUCED AT PHILADELPHIA

little less and building for the future was a better investment.

No time was lost. The contract was let on August 6, and the ground broken four days later. The first power-driven machinery was put in operation on October 16, and the entire plant was completed by November 28, 1917, 110 days after breaking ground. Commander Coburn was appointed as first manager of the factory and reported at the Philadelphia Navy Yard for this duty August 27, 1917.

The first mechanic was employed on October 1. Employment posed a difficult problem, particularly at the beginning, for most of the employees, including superintendents, engineers, inspectors and foremen, had to be trained to execute their particular tasks. Of 400 engineers and technical men, not more than ten had had previous airplane experience. By executive order of August 23, 1917, special classes of employees were exempt from competitive examination, but others were obtained in accordance with Civil Service regulations.

THE NAF log indicates that the first women employees went to work in December in the Inspection Department, inspecting turnbuckles. Special efforts were made to use and train women employees, and on April 10, 1918, the women's apprenticeship school opened at the factory. By the end of the war, women made up practically 25 percent of the entire force. They were employed on the principle of equal pay with men for equal work.

A training school was also conducted for enlisted men who were sent abroad for assembly and repair of planes. On January 26, 1918, an ensign arrived from Pensacola to make arrangements for the first group of 50 men from Pensacola to get this training. They arrived on the 28th.

The original proposal for the factory had envisioned the building of training planes only, but this plan was quickly revised since enough trainers were being built by other factories and what was needed were types of aircraft suitable for antisubmarine patrol and convoy duty. The Factory therefore began work on the production of Curtiss H-16 twin-engine flying boats. On October 12 the form for the first boat was laid and the work of ordering material and putting the H-16 into production began. On October 17 actual work on the first boat was started and, on November 2, the first keel was laid.

The upper wing span of the big flying boat measured 96 feet and its hull was 46 feet long. It was powered by two Liberty engines, armed with four machine guns, and carried a crew of four or five—a pilot, one or two observers, a mechanician and a wireless operator.

Plans for the H-16 had to be completely redrawn to fit the production methods employed by the Factory. While the Curtiss Company's experienced foremen and skilled workmen did not need absolutely clear, detailed drawings of every minor part, the inexperienced NAF employees required complete information. This careful and thorough redrawing of the plans, which required the better part of two months, was the work of the Factory's first Chief Engineer, George R. Wadsworth, a major in the Signal Corps, USA, serving in this capacity while on active duty.

On March 27, 1918, just 228 days after ground was broken and only 151 days after receipt of the original plans, the first NAF-built H-16 made its initial flight. A few days later, this aircraft and another H-16 were shipped to Killingholme, England, for war service overseas. These were the first of 50 authorized under the Factory's original contract, the last of which was completed on July 7.

In citing this accomplishment, Sec-

NAVAL AIRCRAFT FACTORY

retary of the Navy Daniels wrote, "Too much praise can not be given to Commander F. G. Coburn, the capable naval constructor and executive under whose direction this plant was constructed and is operated."

By December 1917, expansion of the planned operating program required an upward revision of scheduled aircraft procurement. The new schedule called for delivery of a total of 864 twin-engine flying boats of the H-16 or similar type by January 1, 1919. The total requirement exceeded not only the number on order but also the capacity of existing manufacturing plants. An enormous expansion of the Naval Aircraft Factory was therefore authorized.

It was estimated that $3,250,000 would be required to build the new facilities. Subsequently, an additional $500,000 was needed to cover the cost of a hangar and certain waterfront improvements. In addition to the hangar, there was to be a six-story concrete storehouse and a three-story office building; the assembly building was to be enlarged. When, in June 1918, the original plant was in full production, the new one was very nearly completed. The total space available upon completion was 888,935 square feet, of which 500,000 square feet were used in the manufacture and assembly of aircraft. The rest was devoted to office space and storage.

The assembly building consisted of two parts: a low building 13 feet under the roof trusses for panel shop, varnish and dope room, and pontoon manufacture, and a bay—100 feet wide, 51 feet under the trusses and 680 feet long for final assembly—which was flanked on either side by a bay of equal size, 50 feet wide and 30 feet under the trusses. The 100-foot bay was equipped with two ten-ton, three-motor, overhead traveling, electric cranes. Each of the side bays was equipped with a two-and-a-half ton small crane.

By the end of World War I, over 40 acres were occupied by the enlarged plant. A considerable increase in paving, railroad tracks, roadways, etc., was provided for in the allotment, which, including the hangar, represented a total investment of a little over $4,000,000.

Almost before this construction program began, the NAF on February 28, 1918, received an order to produce 100 H-16's in addition to the 50 it was already building. Because there was hardly time to wait for the completion of the new buildings, an ingenious plan of sub-contracting was devised. By it, the facilities of many small manufacturers were put under contract to produce wing panels, boat hulls and other more minor parts which were delivered to the Factory for assembly. By the summer of 1918, when production was at its height, the assembly plant was drawing parts from the Victor Talking Machine Company, seven yacht builders, two small aircraft factories, a number of furniture factories and automobile and sheet metal products factories. Except for the two small aircraft shops, all these plants had been drawn into the work by the Naval Aircraft Factory organization which maintained branch offices in each of its contributory plants. In addition to the nearly 3,700 persons directly engaged at the Naval Aircraft Factory, there were some 7,000 others employed in the manufacture of parts.

By MID-SUMMER, 1918, the factory was building the F-5-L flying boat which was based on an experimental British type. It had greater endurance and was capable of carrying a heavier bomb load. Also, it was larger: its 103-foot, 9-inch wingspan was attached to a 49-foot, 4-inch hull. The F-5-L had a gross loaded weight of 13,000 pounds and a maximum speed of 89 miles per hour. Its two Liberty motors developed 360 hp each.

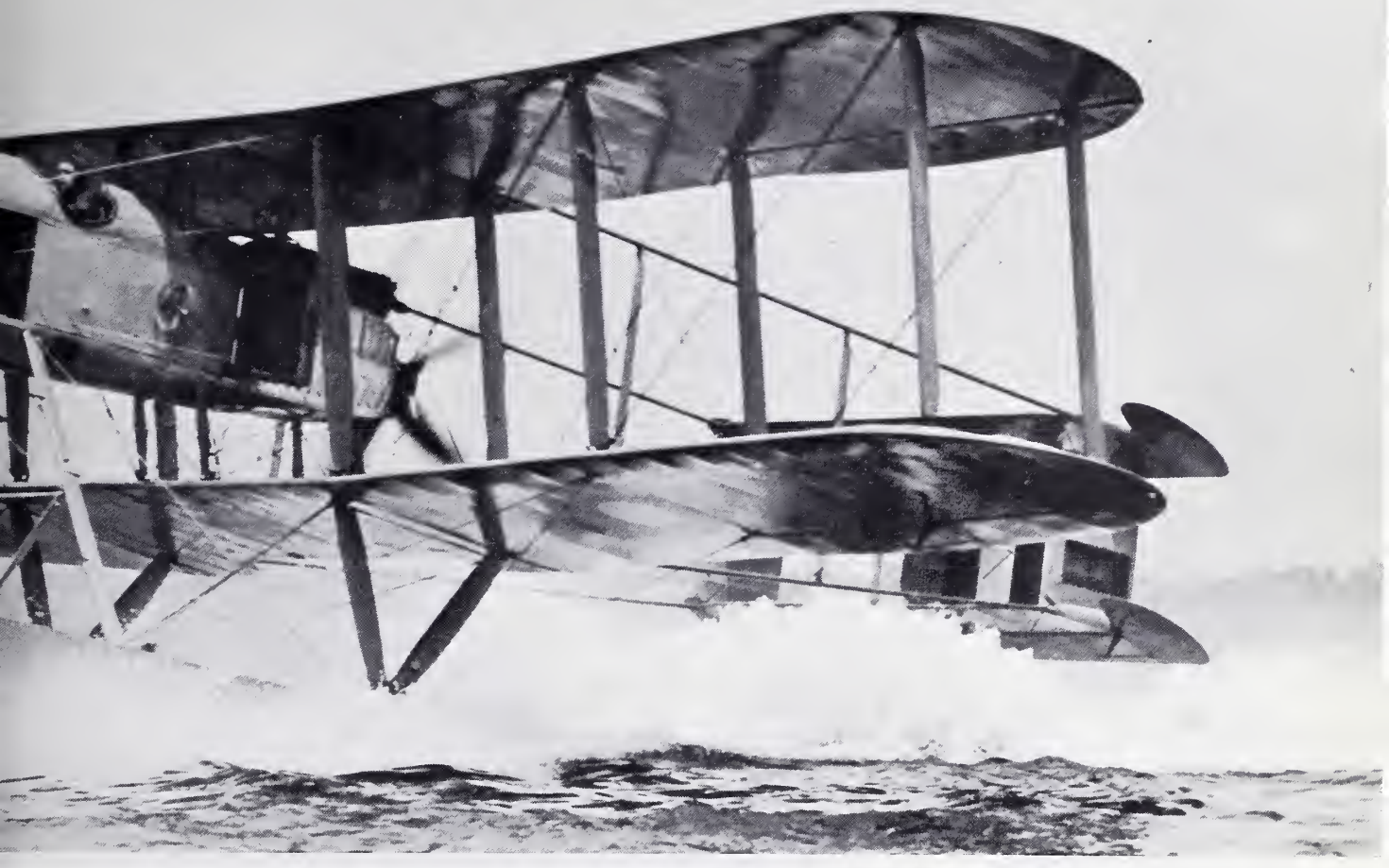
The British Admiralty, at the request of Admiral W. S. Sims, USN, Commander of U.S. Naval Forces in Europe, furnished the Navy Department with the drawings of the F-5. On March 15, 1918, Mr. Ward, a Royal Navy Flying Corps warrant officer, arrived from Felixstowe with the plans for the F-5 boat, of which one experimental model had been built in England. But these drawings were entirely impossible for quantity manufacture. They required hand cutting and fitting by experienced workers using materials not available in quantity.

The labor of converting H-16 plans to standard plans was slight compared with the labor involved in the complete redesign of the F-5, preserving external dimensions, of course. All

metal parts had to be redesigned for machine fabrication by our methods. Since the hull in particular was considered weak by Commanders H. C. Richardson and J. C. Hunsaker, Commander Richardson completely redesigned it on a longitudinal framing system, preserving the outer lines only. The engine installation, designed for Rolls-Royce engines in the British boat, had to be redesigned to take Liberty motors. Thus the American F-5-L, resembling its British prototype only in essentials, was created.

The *Philadelphia Ledger* of October 5, 1918, described the F-5-L, a model of which was on display at the City Hall Plaza, in terms of its lethal capacity as follows: "Directly under each of the two lower wings are two death-dealing depth bombs. These are controlled by a pilot, who, on discovery of a U-boat, can discharge any one of the bombs. Adorning the port cockpit in a ring mount is a Lewis machine gun. Another is at the rear of the plane,

N-1 SEAPLANE ON AN EARLY TRIAL AT NAF



while two others are at either side."

In June 1918, production had reached the point of one aircraft a day. On July 7, the last of the original order of 50 H-16 flying boats was completed. The average cost of the last 20, including overhead, was less than half the average of the cost of the first ten.

The total output of the Naval Aircraft Factory to December 31, 1918, included 183 twin-engine patrol flying boats, with 50 sets of spare parts. Of the 183, the last 33 were F-5-L's.

To appreciate fully the magnitude of the job accomplished, one must remember that the Navy was only six years away from its purchase of its first aircraft, the A-1, and all the main advances in manufacture in quantity were still in the future. To start from scratch as the Naval Aircraft Factory did and be required at the same time to turn an inexperienced group of people into a force of skilled workers might well have turned into a shambles of an obstacle race gone wrong. But it did not, and the record shows that the Navy planners and designers did a magnificent job in record time.

In addition to the production figures cited, the factory also began an aircraft repair program in December 1917 and built its first experimental plane in 1918, the Navy-designed N-1 Davis Gun Carrier. Two of these were built during the war. From the receipt of the plans and specifications on January 24, 1918, it required all of four months to complete the first on May 22. When this plane met with an unfortunate accident before taking to the air, a second was ready for flight on July 25 and two days later made its first (of many) in-flight test of the Davis gun.

And then the Armistice! The NAF log for that day bears quoting: "Monday—clear: (a) Employees paraded around factory in celebration of Germany's defeat. (b) Manager Coburn spoke to all hands in front of New Office Building. (c) Factory closed down at 11:30 A.M."

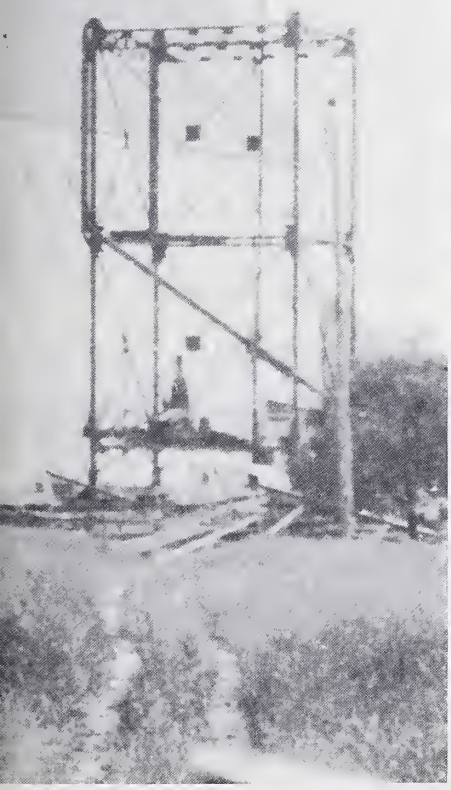
Not a day was lost in cutting back, for an entry for November 12 includes this item: "Contracts for all sub-contractors were cancelled, all boats prior to 6th operation will not be completed." By the summer of 1919, the Naval Aircraft Factory had reduced its force to approximately 1,400 men.

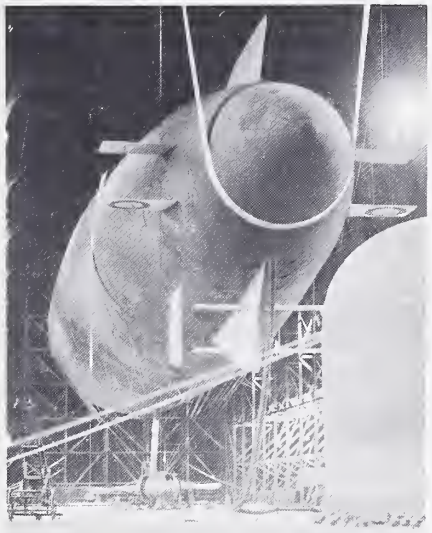
BUT AIRCRAFT had come to stay and the factory went on. Over the years, reorganization drew off its functions and redesignations gave it new titles, but neither could take away the record of its accomplishment as a Naval Aircraft Factory. No longer having an entity of its own but existing as a number of subordinate commands of the Naval Air Engineering Center, the record it set as a factory in producing twin-engine flying boats during WW I will stand as one of the great accomplishments of the war and a challenge to all its progeny.

By W. L. Hamlen

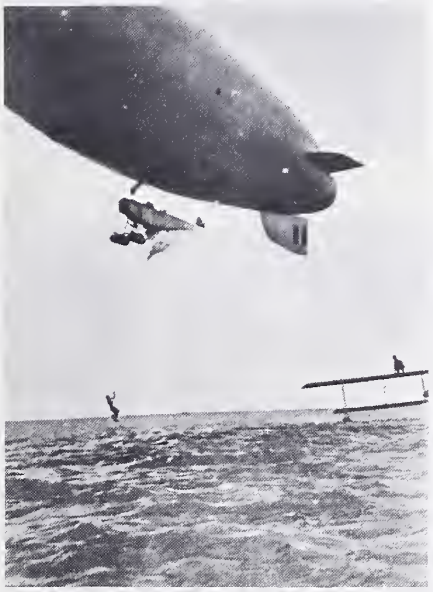
On May 29, 1917, the Navy made a contract with the Goodyear Tire & Rubber Company of Akron, Ohio, to train 20 men in free ballooning and in the operation of kite balloons and dirigibles. Negotiations for this training began before the declaration of war. Goodyear had already started construction of a training field and, when the contract was signed, was ready to receive the students. The story of the first men to be trained there is told by one of them, Naval Aviator No. 101.

First Lighter-Than-





LOOKING SOUTH *from the landing field at Akron (left); above, the French dirigible "Capitaine Caussin," a sight well known to Akron men reporting for duty in France.*



A TRANSFER *at sea off NAS Key West, Fla., where some of the Akron students reported for duty after completing their training.*

Air Class at Akron

LIKE hundreds of young Americans in the spring of 1917, I wanted to fly—and I wanted to fly Navy. All I had to back up the desire was less than a year of college and five years of weekend ballooning as a member of the Flight Club at Akron, sponsored by Goodyear. I was working in Chicago at the time and I haunted the local recruiting office and the Great Lakes Training Station, seeking a way in.

In mid-May I received my call. A letter from Great Lakes, stating that I was eligible for enrollment as a Seaman 2nd Class, Class 4, for training in aviation, instructed me to report for a physical. I reported and I flunked—underweight! My only recourse was to request a waiver, but no one knew how long that would take or if indeed it would be granted.

One of the circulars accompanying the letter from Great Lakes referred to "work to be done about aircraft (airplanes, seaplanes, balloons and dirigibles)." This indicated to me that Goodyear might be involved. Since Akron was my home and I was a former Goodyear employee, I got on the phone and learned that extensive plans were being formulated for Navy lighter-than-air training at Akron and that Goodyear was indeed involved. Details would have to come from the Navy Department, but Navy personnel in Chicago were helpful to the point of indicating that the program was to get underway on June 1st. They also suggested that I go to Akron to see the senior naval officer. They gave me a letter dated May 26, 1917, addressed to that officer, stating that waivers on weight had been requested and that I was otherwise qualified.

On arrival in Akron, an inquiry or two revealed the senior officer's name, Lt. Louis H. Maxfield, and his current headquarters. An early phone call on a

First Lighter-Than-Air Class at Akron

rainy morning announcing the arrival of his first trainee, who was not even enrolled in the Navy, was, he told me later, somewhat of a surprise. Lt. Maxfield instructed me to meet him next morning at 0830 for a trip to the "station" located at Fritsche's Lake (later Wingfoot), a few miles southeast of Akron. After reminding me not to discuss my un-enrolled status with anyone, we took off in a pickup truck assigned to the unit by Goodyear. En route, we speculated on where the rest of the trainees were and when they might arrive.

The station area was a sea of mud. However, a landing field had been cleared and leveled, a hangar measuring 400x100x100 feet was almost complete, shops had been built and equipped, a hydrogen plant was ready for use and barracks for the students and quarters for the officers were finished. A temporary mess hall had been provided in a farm house on the property and work was being rushed on larger barracks, mess halls and other facilities necessary to house the station complement of enlisted men when they arrived. All this construction on a field of roughly 720 acres was done in an incredibly short time by contractors working night and day under Goodyear supervision.

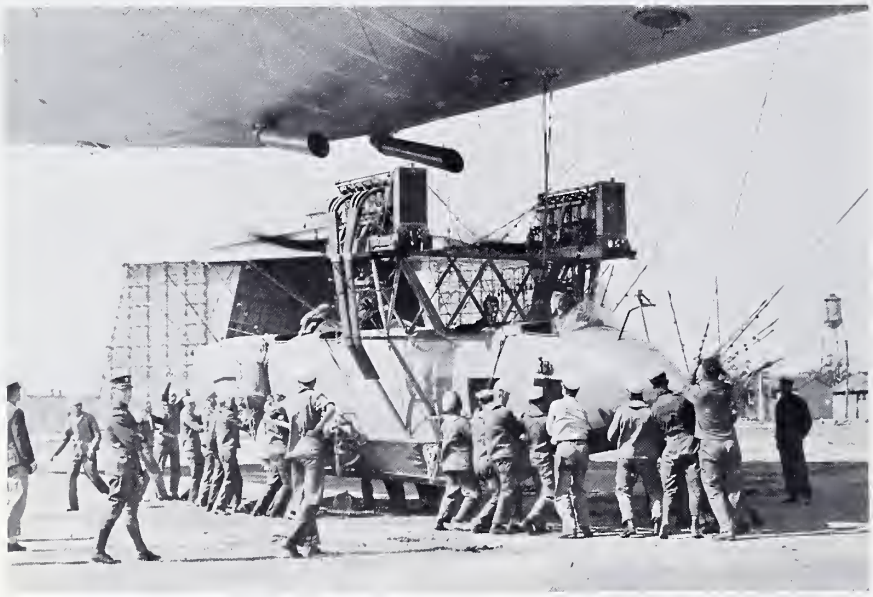
I learned that arrangements as they stood at the time were that Navy would provide the trainees and Goodyear would do the rest. This included furnishing the equipment and supplies, providing instructors for flight training and for some of the ground school subjects such as elementary physics and meteorology, and responsibility for the day-to-day operation of the field. Naval officers would teach navigation, seamanship, signalling, communications and—Drill! Later many of these subjects were transferred to special Ground Schools such as the one at MIT, but for our gang, Wingfoot Lake was it.

Returning to town, we found that three officers and one trainee had arrived. The officers were: Ltjgs. Emory W. Coil and Ralph G. Pennoyer and Ens. Frederick P. Culbert, all of whom would serve on the staff; the trainee was Colley Bell. Next day we moved to the station. Ens. Culbert drove his own car, the rest of us piled into the pickup. I don't know how the officers worked out the assignment of quarters, but Bell and I had free choice in the barracks and we picked bunks in the corner, where there was good cross-ventilation, and far away from the stairs and showers.

Before too long, we were called below—pleasantly enough, this being the first time—and asked what experience we had in drill. Our answer was negative. Every day from then until the rest of the group arrived, the two of us marched and countermarched, forward and to the rear; we advanced as skirmishers, faced right, left and about; and soon could do the grand right and left by squads with our eyes closed. We heard many a snicker and guffaw from the civilians, but our officers appeared to take it seriously, as indeed we did. Neither one of us will ever forget Ens. Culbert.

B CLASS AIRSHIP

NAVY'S C-7



AT PENSACOLA, *April 1920, ground handling crew holds the C-7, later to become the first airship inflated with helium. The C ships arrived too late for extensive use in the war.*

After only a few days, which seemed like weeks to Bell and me, the main body of the first class arrived. As finally constituted there were 12 members, as follows: Colley W. Bell, Arthur D. Brewer, Noel Chadwick, George Crompton, Merrill P. Delano, Richard C. Gartz, Warner L. Hamlen, Charles G. Little, Ralph M. Strader, Andrew B. Talbot, William P. Whitehouse and Arthur S. Williams. Of the 12, seven were from Harvard.

After reporting aboard, the scrambling for bunks ended up with all hands reasonably satisfied. Compared with some of the quarters in those early days, we were well off, as many of us were to learn in future assignments. Class schedules were now posted, notebooks broken out, and we were ready for the serious business of learning to fly.

We started on the ground with classes in Theory of Flight, Meteorology, Signalling and Radio, Engines,

much of which was practical work, and—Drill. Flight training was in three types of lighter-than-air craft. We began with kite balloons which were tethered by a cable to a winch on the ground. Three flights were required at between one and two thousand feet, primarily to accustom us to the sensation of being in the air but also to give us some experience in reading instruments. From these, we graduated to free balloons. These ride the air and wind currents and can be controlled only to the extent of changing altitude to meet air moving in the general direction of desired travel. The balloon rises when ballast is dropped; descends when gas is valved. We made three flights as passengers in these balloons and then two solo flights of about one hour each. On the latter, the student supervised inflation, directed the start and, after landing, deflated and packed the balloon for return to base in a pickup truck.

One of my darkest moments occurred during my first free hop. Lt. Maxfield was the skipper and there were two others in the basket with us. Lift-off was uneventful. We sailed along, keeping an eye on the ground crew following us in the pickup truck. It carried two students who would exchange places with us as we made two intermediate landings. On the first landing I was to be first out and, in spite of my previous experience in ballooning, all I could think of was the "step lively" instruction given by the skipper. I was out before my replacement had a chance to get aboard and with the load suddenly lightened the balloon went up, fast, to almost 9,000 feet, before the skipper could stop the ascent. I didn't dare look up. They lost so much gas stopping that further flight had to be abandoned and I had to face the stony silence of all of them as we packed up the balloon and loaded it on the truck for return to the station.

FROM balloons we progressed to blimps. The first we flew were the A type, slimmer and more pointed than those of later years. Then we moved on to the B's, but there were many modifications of both. The earliest had three ballonets inside the envelope, the center for hydrogen and those fore and aft for air. The air bags were separately connected to a blower engine in the car. By blowing air into or exhausting it from these ballonets, the nose or the tail could be made heavy or light to bring the nose up or down. The volume of air also provided pressure to compensate for the expansion and contraction of the hydrogen gas during ascent and descent, thus retaining the shape of the envelope and the tension on all cables to the car. In later models the arrangement of the ballonets was modified and an air scoop set in the prop wash replaced the blower engine, but the principle of operation remained the same. The car was simply a modified Curtiss *Jenny* fuselage, complete with OX-5 engine, slung under the bag. Skids with small pneumatic bumper bags underneath were used instead of wheels. Three-place affairs, the forward seat was for the mechanic, the after seat for the aide and the center seat for the pilot. Progress of the student determined his place. The course required 18 flights in all. On the first five, the student served as mechanic with responsibility for starting the engine and watching over it generally. On the next five, he rode in the back seat from which point he operated the blower motor, if the blimp had one, and began operating the dual controls under direction of the pilot/instructor. Assuming he was ready, he then took over as pilot with the instructor in the after seat, and, after a few flights in full command, he was ready for the final qualification flights.

Our first muster was something to see. Uniforms were only things to dream about and look forward to. Nothing matched anything; black shoes—brown shoes, yachting caps—pancake caps, wrap-arounds—leather puttees—no puttees, jodhpurs—slacks; each outfit reflected individual personality. Not a few Adam's apples bobbed up and down as our officers

THE FIRST CLASS. *Students standing: Gartz, Whitehouse, Delano, Williams, Talbot, Little, Brewer, Hamlen, Strader, Crompton and Chadwick. Sitting: Pennoyer, Norfleet, Culbert, Preston (of Goodyear), Maxfield (C.O.) and Coil. The mascot is Maxfield's Lanny.*

First Lighter-Than-Air Class at Akron

looked us over. Lt. Maxfield took appropriate action. Within the week, a naval tailor from Washington promised an early appearance which he made, complete with tapes, chalk, measurement pads, swatches and photographs galore—to show how we would look. Visions of khakis, greens and dress blues, leather puttees, shoulder boards and caps with assorted covers were just too much for some of us. All evening the phone was kept hot as families, sweethearts, girl friends and business friends had to be told the good news. It was mid-July, however, before the uniforms arrived. Having them perked up our appearance considerably; we all stood a little taller and straighter.

On June 22nd, Lt. Maxfield issued orders involving actual flying of naval aircraft to all of the group—except me. I was still not enrolled. But on that same day, I was notified that my request for waiver had been granted and I could now be sworn in. After better than three weeks of hard active duty, I was finally in the Navy.

Training went along on schedule. With preliminary ground school well underway, we started in kite balloons on June 16, moved to free balloons the next week and then progressed to blimps about the middle of August. We accomplished some things that loom important today but at the time none of us knew enough to realize it. We did know what was going on, however—we were flying like crazy. This was particularly true after a distinguished looking, middle-aged gentleman arrived on the station, carefully carrying a glass tube or bottle some 20 inches tall. We had no idea what it was but it looked exactly like today's radio tube in a giant economy size. It was Dr. Lee DeForest who, with Lt. James Lavender, was engaged in a research project associated with ground-to-air communications. Between training flights, we took them up or helped handle the lines, day after day. Sometimes they would scarcely be clear of the ground before the "land" signal was given and down they would come again. It was exhausting work but it gave us what we know now was an opportunity to participate in a small way in an important development.

Eventually these experiments were completed and our training continued. By now we were flying on longer and more frequent flights. Night flights came into the picture and, although we had all been up at night in a balloon, a night flight in an airship was an interesting experience. Finally we began to qualify. On September 21, the first eight men successfully passed the final tests and when the recommendation of our commanding officer was approved by the Secretary of the Navy on October 5, 1917, they were designated Naval Aviators (Dirigibles). The others qualified not too long afterwards.

By late October, shoulder boards and cap devices could be broken out and our uniforms were complete. We were now Ensigns, USNRF, and ready for any operational task to which the Navy might decide to assign us.

The detachment of our commanding officer, LCdr. L. H. Maxfield, and Ltjg. F. P. Culbert on September 27, and the assumption of command by Lt. E. W. Coil was the beginning of the change. But for us the real break-up began on October 7. On that day, seven of us destined for immediate assignment overseas were given leave

FREE BALLOON *flights continued as a part of the training program in post-war period.*

to await further orders. They came on November 2. We were ordered to France with several stops en route. It turned out to be quite a tour.

On November 9th, we gathered at the Brooklyn Navy Yard—Strader, Talbot, Whitehouse, Brewer, Little, Delano and Hamlen—and sailed aboard the American liner *St. Louis*. The monotony of the voyage was tempered by the company of young ladies of the Red Cross, chaperoned by Mrs. J. Borden Harriman, en route to service in France. After landing at Liverpool, we "Reported Aboard" to the American Consul at Liverpool; to Admiral Sims and the Naval Attache at London; to the Commander, U.S. Naval Aviation Forces, France, and the Naval Attache at Paris; to the Commandant, Centre d'Aviation Maritime and the U.S. Navy Senior Officer Present at Rochefort; to the Commandant, Patrouilles Ariennes de la Loire at St. Nazaire; and to the U.S. Navy Command at Center de Dirigible, Paimboeuf.

Although there was little chance of getting lost on this one-week journey, what with the "tabs" being kept on us, there was at least one bright spot—and one dark one. The first was a pleasant reunion with LCdr. Maxfield at Rochefort which carried on to duty at Paimboeuf under his command. The shocker was our first lunch at the Officers' Mess at Rochefort where we were informed that we were to speak only French in the Mess as well as elsewhere on board, as quickly as we could get a working vocabulary in shape. The second was that the entree at our first meal was escargots—snails, by whatever other name, to me! Thank goodness there was plenty of *vin rouge* available.

Those less fortunate than we were assigned to duty at lighter-than-air patrol stations along the Atlantic Coast. Gartz went to Cape May, Bell to Rockaway, Crompton and Williams to Montauk Point, and Chadwick, who would eventually go to Key West, stayed on at Akron to help train the next class. It was considerably larger than ours and included many of the enlisted men who had handled our lines and kept us flying.

Others who took training with this class while serving on the staff or in other capacities included L. H. Maxfield, E. W. Coil, F. P. Culbert, R. G. Pennoyer and W. G. Child, all of whom qualified before leaving, and Ralph Kiely, Zachary Lansdowne and J. P. Norfleet, who completed their training at other locations.

Training continued at Akron through the war period and as more men acquired the necessary skills, the Navy gradually took over more of the responsibility for instruction and upkeep. When graduates of the Ground School at MIT began arriving, some reduction in the length of the course was possible by eliminating some of the ground subjects already covered at that school.

This was the first airship pilot-training program established by the Navy. Through the war, Akron remained the main source of LTA pilots, although some were trained at other stations. The Company and the many people of Goodyear, who undertook this program without previous experience in airship design and with very little background in their operation, deserve credit and praise for their enterprise, their contribution to the war effort and, above all, their work in making this the true launching of the Navy's lighter-than-air program.

AFTER SIX MONTHS OF WAR

The program was beginning to roll. Units were being organized, stations were going into operation, war patrols were being flown and the number of qualified aviators was about to be quadrupled. Much remained to be done but actions taken early in the war were producing tangible evidence of steady progress toward expansion.

OCTOBER 1917

1—An Act of Congress transferred control of the Aircraft Production Board from the Council of National Defense to the War and Navy Departments, enlarged its membership for greater service representation and changed its title to the Aircraft Board.

6—The Secretary of War authorized the Navy to use part of the Army field at Anacostia for a seaplane hangar. Terms of use were within those of a revocable license, beginning 1 November 1917, for the duration of the war and six months.

14—The Marine Aeronautic Company at Philadelphia was divided into the First Aviation Squadron under Capt. W. M. McIlvain, USMC, and the First Marine Aeronautic Company under Capt. F. T. Evans, USMC. On the same day, the latter command transferred to Cape May, N.J., for training in seaplanes and flying boats; three days later, the First Aviation Squadron transferred to the Army field at Mineola, Long Island, for training in landplanes.

15—NAS Rockaway Beach was commissioned with LCdr. Warren G. Child in command. Originally established for seaplane patrol and kite balloon training, facilities for LTA patrol were added before many months.

16—Only 67 days after ground was broken for construction of the Naval Aircraft Factory, its first power-driven machine went into operation.

21—The 12-cylinder Liberty engine was successfully flown for the first time in a Curtiss HS-1 flying boat at Buffalo, N.Y. This and other successful demonstrations led to adoption of both engine and airplane as standard service types.

22—Special courses to train inspectors of aeronautical material were added to the Ground School program at MIT with 14 men enrolled.

24—Instruction began at NAS Moutchic, France, a U.S. training station serving naval air units in Europe, with organized classes in the Ground School and dual instruction in the Flight School.

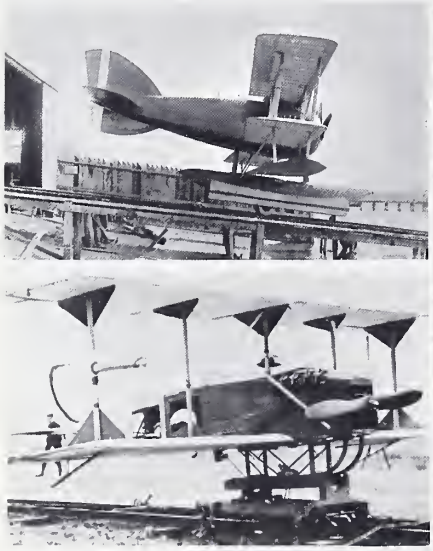
24—United States Naval Aviation Forces, Foreign Service, was established over all Naval Aviation forces abroad under command of Captain H. I. Cone.

NOVEMBER 1917

2—Twelve men who had organized as the Second Yale Unit and had trained at their own expense at Buffalo, N.Y., were commissioned as ensigns and soon after were designated Naval Aviators.

5—To coordinate the aviation program within the Navy Department, Captain N. E. Irwin, Officer in Charge of Aviation, requested that representatives of bureaus having cognizance over some phase of the program meet regularly in his office to discuss and expedite all pertinent matters.

9—Permission was received from the government of Argentina to use three officers of the Argentine Navy, recently qualified as U.S. Naval Aviators, as instructors in the ground school at NAS Pensacola. The men were: R. Fitz Simon, Ceferino M. Pouchan and Marcos A. Zar, numbered 95 a, b and c respectively in the precedence list of Naval Aviators.



CURTISS *HA initiated the Navy's development of fighter aircraft. The Flying Bomb was an early attempt to develop a guided missile. NAS Rockaway supported seaplane and blimp patrol of approaches to New York Harbor; was later starting point of NC trans-Atlantic hop.*

HS-1 *Curtiss patrol plane was test bed for 12-cylinder Liberty. Men at Le Croisic upon commissioning, back: C. Wheatley (MC), Paymaster J. C. Bequette, W. M. Corry (C.O.), R. H. Bush (X.O.), S. S. Walker, R. G. Coombe; front: K. R. Smith, H. H. Landon and interpreter.*

10—A Navy "flying bomb," manufactured by the Curtiss Company, was delivered for test to the Sperry Flying Field at Copiague, Long Island. Also called an aerial torpedo and closely related to the guided missile of today, the flying bomb was designed for automatic operation, carrying 1,000 pounds of explosives at a specified range of 50 miles and top speed of 90 miles per hour. In addition to this specially designed aircraft, N-9's were also converted for automatic operation as flying bombs that were closely related to the guided missile of today.

14—A major step in assuring the success of the Navy's WW I aircraft production program was taken when the Secretary of War, Newton D. Baker, approved a recommendation "that priority be given by the War Department to naval needs for aviation material necessary to equip and arm seaplane bases."

15—A Committee on Light Alloys, with Naval Constructor J. C. Hunsaker a member, was established within the NACA (National Advisory Committee for Aeronautics) to intensify the effort to develop light metal alloys for aeronautical use.

21—A demonstration of the Navy N-9 flying bomb at Amityville, Long Island, which was witnessed by Major General George O. Squier, USA, led the Army to establish a parallel project.

22—A Tellier seaplane, piloted by Ens. K. R. Smith with Electrician's Mate Wilkinson and Machinist's Mate Brady on board, was forced down at sea on a flight out of LeCroisic to investigate the reported presence of German submarines south of Belle Isle. Two days later they were rescued by a French destroyer and minutes after being taken aboard, their damaged plane sank to the bottom. It was the first armed patrol by a U.S. Naval Aviator in European waters.

24—In discussing the development of aircraft torpedoes, the Chief of Naval Operations pointed out that available aircraft could carry a load of not more than 600 pounds and thus were incapable of delivering by this means an explosive charge large enough to seriously damage a modern warship. This problem, the size of an effective torpedo versus the capabilities of aircraft, retarded torpedo plane development in WW I and continued as an important factor in post war years.

27—NAS LeCroisic, France, was commissioned with Lt. William M. Corry in command. Located just south of the Breton Peninsula, the station provided seaplane patrol over convoys entering the Loire River. It was the first overseas patrol station to go into operation.

DECEMBER 1917

1—NAS Pauillac was commissioned as an assembly and repair and supply station for all U.S. naval air stations in France. Ens. R. F. Nourse was acting commanding officer until Lt. Henry B. Cecil arrived in February.

4—NAS Cape May, N.J., was commissioned as a seaplane and LTA patrol station. The First Marine Aeronautic Company trained here from 14 October until it departed for duty in the Azores in January.

5—The policy regarding helicopter development was established by the Secretaries of the War and Navy Departments on the basis of recommendations made by the Joint Technical Board on Aircraft. Basically, need for improvement in power plants and propellers was recognized as necessary, but actual support of development efforts was to be limited to moral encouragement until a vendor had demonstrated a helicopter of military value.

7—The development of fighter type aircraft was initiated with the Secretary's authorization for the Curtiss HA or "Dunkirk Fighter." This single-pontoon seaplane was equipped with dual synchronized machine guns forward and dual flexible machine guns in the rear cockpit.

7— The Naval Aeronautic Station Pensacola was redesignated a Naval Air Station.

15—The Marine Aeronautical Detachment, under command of Capt. Roy S. Geiger, was organized at Marine Barracks, Philadelphia Navy Yard.

18—NAS Key West was commissioned. Used chiefly as an elementary flight training station, it was also a base for patrol operations.

22—The addition of an Aerography School to the training program at MIT, in which a major portion of the instruction was carried out at the Blue Hill Observatory at Harvard University, was marked by the start of classes with one student enrolled.

31—The First Aviation Squadron of the Marine Corps, under command of Capt. W. M. McIlvain, transferred from Mineola to another Army facility, Gerstner Field, Lake Charles, La., for advanced training in landplanes.

WW I DIARY RECOUNTS AIR/SEA SAGA

WE ARE NOT positive of our location, but are going to sea. Send help. If you should not find us, say we died game to the end."

Such was the message Ens. Kenneth R. Smith sent by carrier pigeon from his seaplane drifting somewhere in the Bay of Biscay on 23 November 1917. With water rising rapidly and the prospects of rescue all but abandoned, the young Naval Aviator and his two crewmen faced the end.

It was Naval Aviation's first airplane to crash-land while on a combat patrol in Europe in WW I. The communication and air/sea rescue techniques were a far cry from the effective speed of such operations today.

Base of the crashed seaplane was a little fishing village of about 3000 inhabitants 18 miles from St. Nazaire, called Le Croisic. The United States had established there on the French coast its first Naval Air Station overseas as a part of WW I operations.

In *The History of the Yale Unit*, it is pointed out that young Smith and fellow members of the unit, which had become part of Naval Aviation, were sent to Le Croisic in order that the American forces might "help to drive German submarines farther away from the coast and to protect the immense amount of transport traffic in and out of Saint-Nazaire . . . .

"The air station was situated on a tiny island separated from the main street of the village by a moat or canal. A rugged indentation of the coast formed a little sheltered harbor which was favorable for seaplanes at high water. An eighteen-foot rise and fall of tide, however, made it necessary to lower machines by means of a crane when the bay was mostly sand and mud."

The building of this station on the Bay of Biscay commenced on 26 July 1917 when 19 German prisoners started to level the ground on which were later erected hangars and barracks.

By 29 October, three ensigns, 13 enlisted men (two of whom were pilots), and 11 observers arrived, some from the United States and others from the French flying schools at Tours and St. Raphael.

Though the first flight from Le Croisic was made 13 November 1917, it was not until five days later that the first patrol flight was made and operations officially started. From that date, weather permitting, patrol and convoy flights were made regularly with six French seaplanes of the Tellier type. Communication facilities were inadequate, and since the time and position of passing convoys were uncertain and there were no adjoining air stations to cooperate in escorting convoys along the coast, long flights were necessary.

TELLIER FLYING BOAT, TYPE USED BY ENS. SMITH, WAS FRENCH SINGLE-MOTORED SEAPLANE

A contemporary record gives this schedule: "At the commencement of patrol and convoy flights, an 'Alert Section' consisting of one fourth of the total handling crews, two observers and two pilots, was put on watch. They stood watch from daylight to darkness, always holding two planes in readiness with bombs attached, all instruments and equipment either in the planes or close at hand, so that it was but a matter of five minutes to lower the planes and get off the water in case a submarine warning was received."

On 20 November when two German mines were reported off Les Grands Cardinaux, two seaplanes were sent out and the district was patrolled, but the mines were not discovered. On 22 November submarines were sighted south of Belle Isle and a seaplane was sent out on patrol, piloted by Ens. Kenneth R. Smith with Homer N. Wilkinson, Electrical Mechanic, and T.J. Brady, MM2C.

The Tellier, which carried only enough fuel for a four-hour flight, failed to return. The search was begun, but even with some idea of where the aircraft might be, it could not be found.

Meanwhile, on the Tellier as the hours passed, so did hope. Thinking they faced death, Ens. Smith wrote an account of what had happened. The very use of the past tense reflected his sense of finality. His notes are now part of Naval History.

Thursday, Nov. 22, 1917

Weather conditions were not ideal for flying, clouds being very low and quite a sea running.

After leaving Le Croisic, we started south steering course 195. On reaching Ile d'Yeu, found our drift to be considerably to the East. After picking up Point Breton on Ile d'Yeu, we sighted a four-masted bark, in ballast with auxiliary engine, to the N.E. We circled over her a number of times, increasing our radius on each turn until we were nearly out of sight of Ile d'Yeu. We then left the bark and headed for Ile d'Yeu. After searching the shore for mines and submarines, returned to Pt. Breton.

From Pt. Breton we steered course 29 for 45 minutes. We then headed due East for 30 minutes at altitude 50 meters. Motor died and we were forced to make a tail-to-wind landing. We found it possible to land the Tellier in rough water. Dispatched at 2:30 P.M. pigeon with following message:

"Left Ile d'Yeu at 1:10 P.M., headed 29 for 45 minutes. Then direct East 30 min. had to come down, big sea running. Send all aid. . . ."

Could not tell for certain our location. We

took watches during the night. One bailed while the other two slept. As we could not get motor started, we thought over all possible things that could happen to it. Wilkinson found left gas tank had not been feeding; but too late to fix it as we could not see. Passed a very uncertain night. We knew they would do all possible things to help us.

Friday, Nov. 23, 1917.

Sent pigeon at 7:40 A.M. and message as follows:

"Sighted last night two lighthouses on starboard bow which we considered Ile d'Yeu. Send torpedo boats and aeroplanes. Have no food. We are taking in water. We are not positive of our location, but are going to sea. Send help. If you should not find us, say we died game to the end."

Put in a new spark plug, cleaned magneto, shifted gasoline from left to right tank. We were all so seasick that we could not work to best advantage. Bailed water out of boat. Wilkinson finally got motor started at 11:40 A.M. Saw hydroplane and "blimp" to the North of us. Did not give up hope. Beautiful day. Got motor going and started to taxi towards Ile d'Yeu. We were not making much headway on account of the sea. Our left pontoon had filled with water.

Finally decided our only hope was to try and get machine off water. As a result of trying, I broke left wing and got ourselves into a hell of a shape. Things began to look black. There was no finding fault with anyone. Could not help marvelling at the morale of the men. It was a case of heroic bravery on their part to see their only hope smashed.

We took watches during the night, first lying on wing, then bailing, then sleeping. Wilkinson turned to and got all ready to cast adrift the left wing. We all decided to die game to end . . . .

Wing began to crumble. We all decided to let it stay on as long as possible. Sea began to grow bitter towards evening, and the water began to come in. We all hoped that we would be able to ride out the night. Very uncomfortable night and we were all growing very weak. Very long night. Our hopes were beginning to go very low, but no one showed it.

Saturday, Nov. 24, 1917

Day finally came. Wing getting near to boat as it crumpled. It was heart-rending. We had to bail and stay out on wing-tip. As waves came over, we began to feel lower and lower. It was finally decided to cast off wing, and let what might come. We tried to get other wing ready to cast off, but we could not get off nuts as we were so weak and tools were very inadequate.

We were going over gradually on starboard side. We were all on port side trying to keep her righted. We then saw that there was no hope of us staying up much longer unless we could get wing off. We had just about given up everything when Wilkinson let out a yell that something was in sight. We were not able to believe our eyes. We thought it was a submarine, but we did not care. If it was a submarine, we hoped it would blow us up and end it all.

It was no U-boat. It was a French destroyer that picked up Smith and his two companions southeast of Rochebonne and took them to La Pallice. Along with patrol boats, motor torpedo boats and destroyers in the area, the French DD had heard of the missing seaplane via telephoned requests for search all along the coast.

The rescue destroyer had arrived none too soon. The badly damaged plane sank within minutes after the crew was taken off. The men suffered from exposure, but all recovered.

Machinist Wilkinson, in making a report after the rescue, wrote, "[Mr. Smith] was brave and courageous from the first. I never heard a whimper from anyone no matter how close we were to death. The accident was no one's fault . . . ."

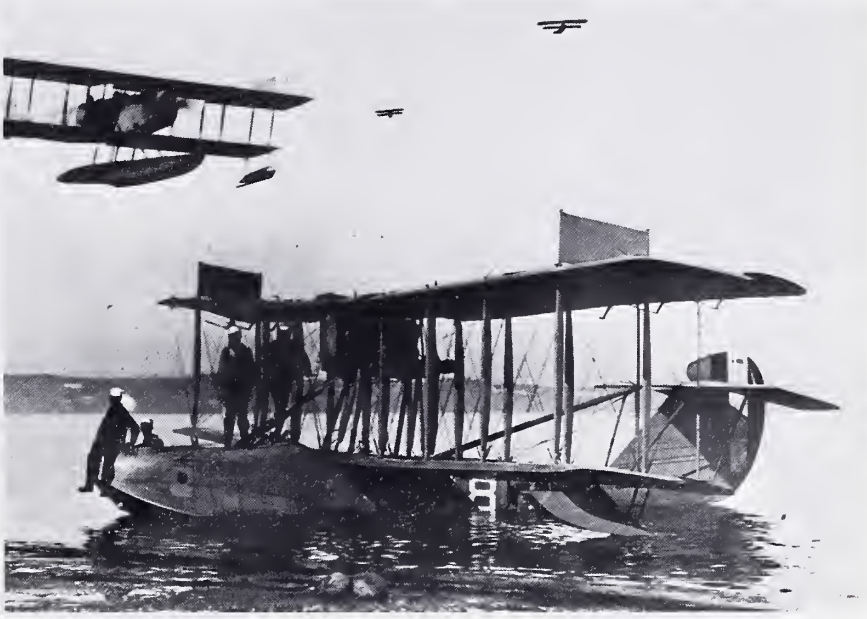
The officer, who had assigned Ken Smith and his crew to the patrol said, "We learned to equip our planes . . . with every possible emergency appliance." The lesson, "hammered in by experience," taught the Le Croisic officers that signalling devices, a sea anchor and emergency rations were absolute musts, and that since three men constituted too heavy a load, only two should be sent. "All of which was a darned good thing for the rest of us, but rather tough on Ken. He had to be the goat." ★ ★ ★

SPIRIT OF CAMARADERIE BETWEEN LE CROISIC AND NAVAL AIR STATION WAS MEMORABLE. U. S. NAVY SEAPLANE FLOATS OFF SHORE

NAVAL AIRCRAFT OF WORLD WAR I

HS-1L PHOTOGRAPHED IN JULY 1919 WAS BUILT BY CURTISS

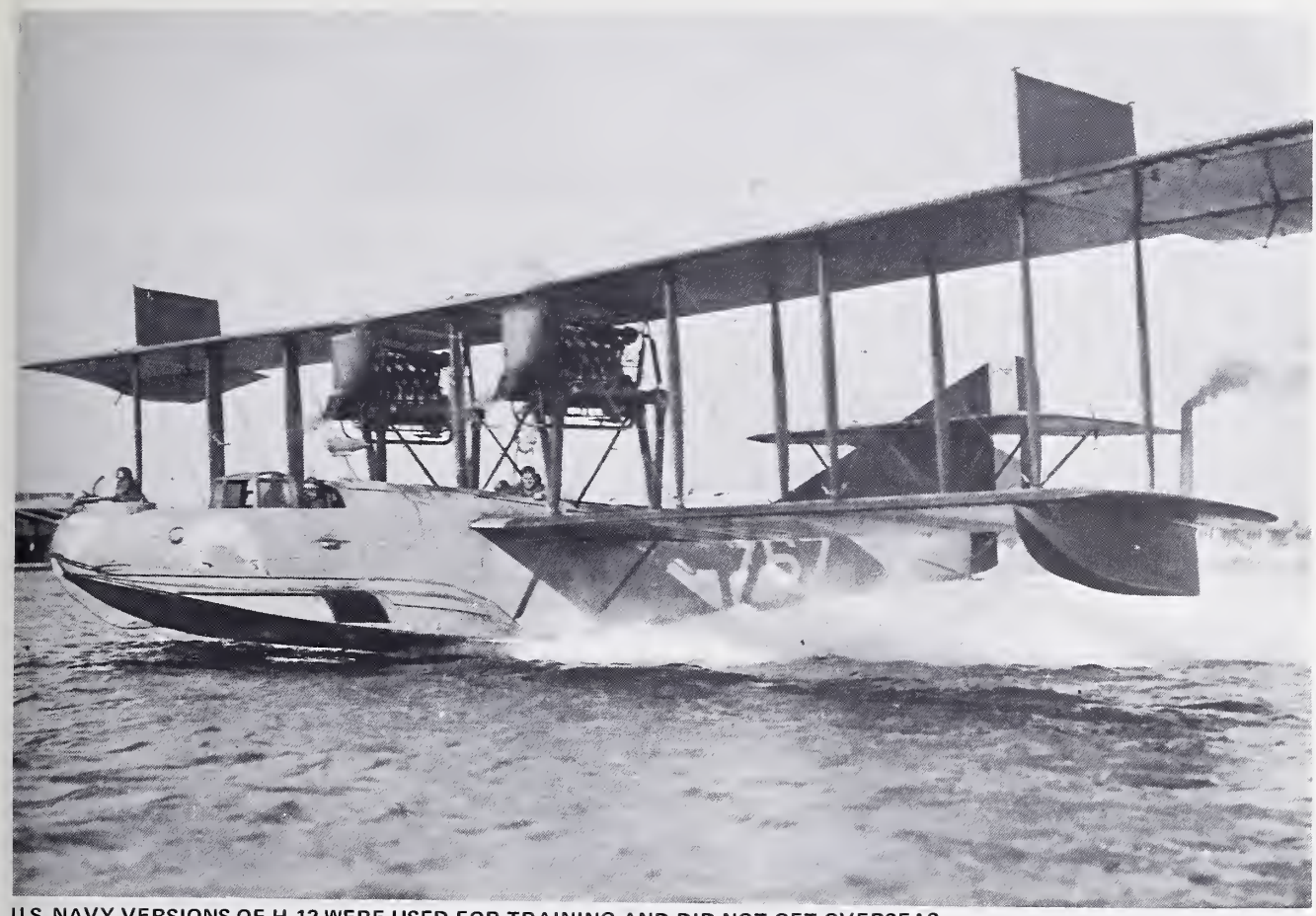
a portfolio



HS-2, SIMILAR TO HS-1, HAD 25 PERCENT MORE WING AREA

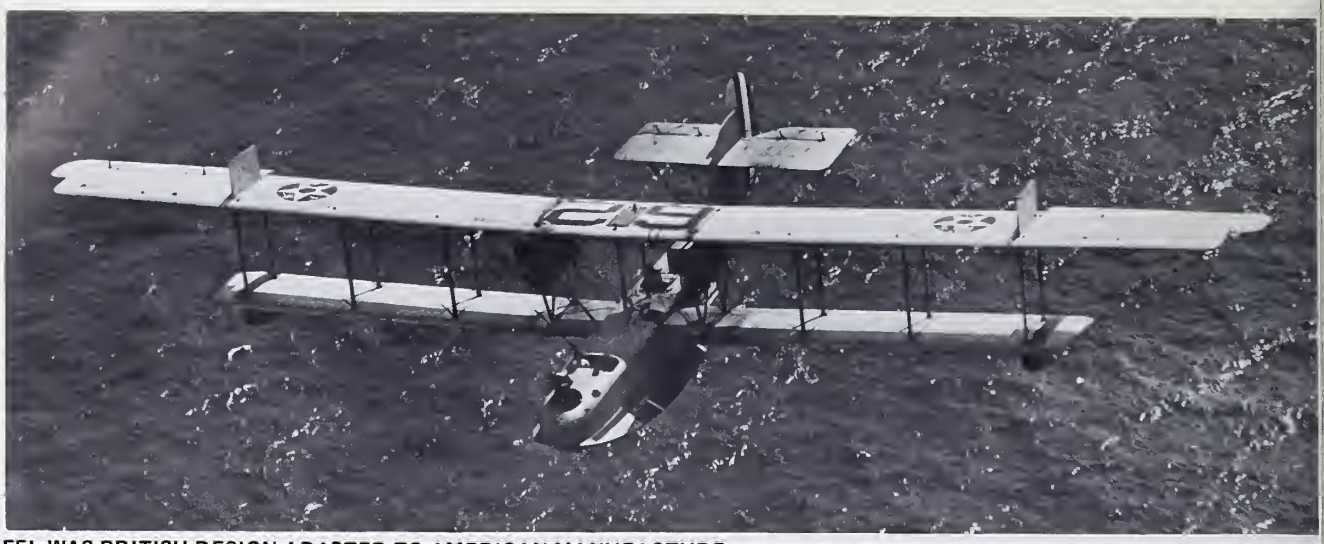
CURTISS N-9 WAS NAVY VERSION OF FAMED 'JENNY'

H-16, SHOWN WITH POSTWAR MARKINGS, WAS THE FIRST AIRCRAFT BUILT AT THE NAVAL AIRCRAFT FACTORY



U.S. NAVY VERSIONS OF H-12 WERE USED FOR TRAINING AND DID NOT GET OVERSEAS

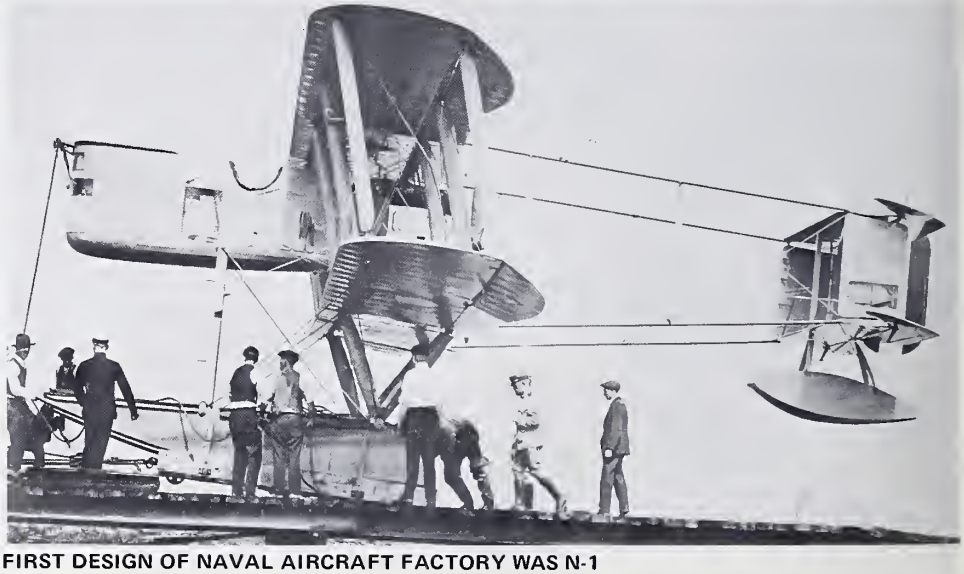
THE F-BOAT, ANOTHER CURTISS DESIGN, WAS PRIMARILY A TRAINING CRAFT



F5L WAS BRITISH DESIGN ADAPTED TO AMERICAN MANUFACTURE

POSTWAR MARKINGS ON F5L IDENTIFIED STATUS OF AIRCRAFT COMMANDER

THE NAVY N-1, *one of several wartime experimental aircraft, was designed especially to use the Davis recoilless gun, mounted in the bow, against enemy submarines.*



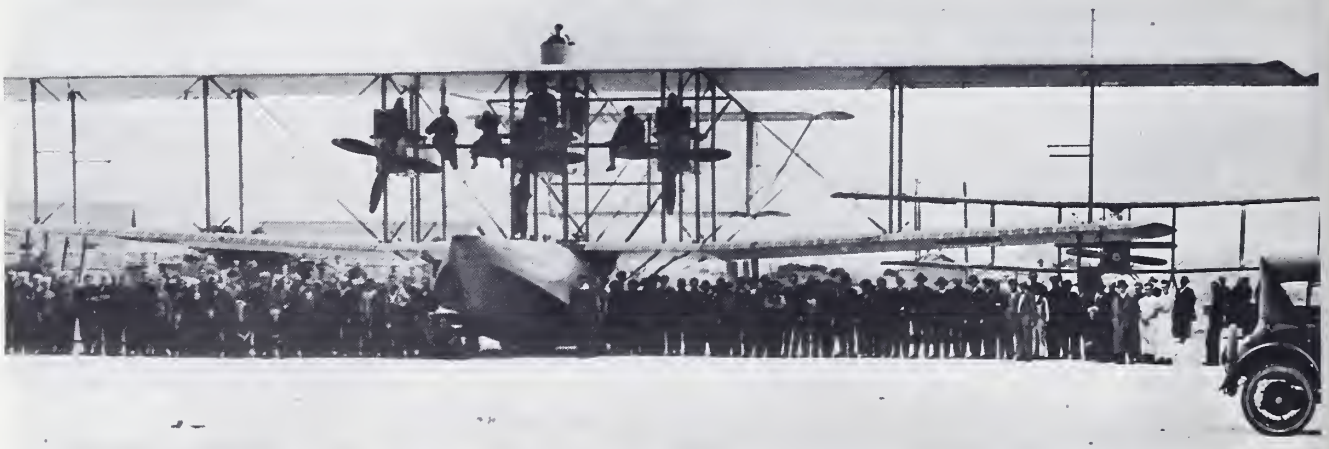
FIRST DESIGN OF NAVAL AIRCRAFT FACTORY WAS N-1

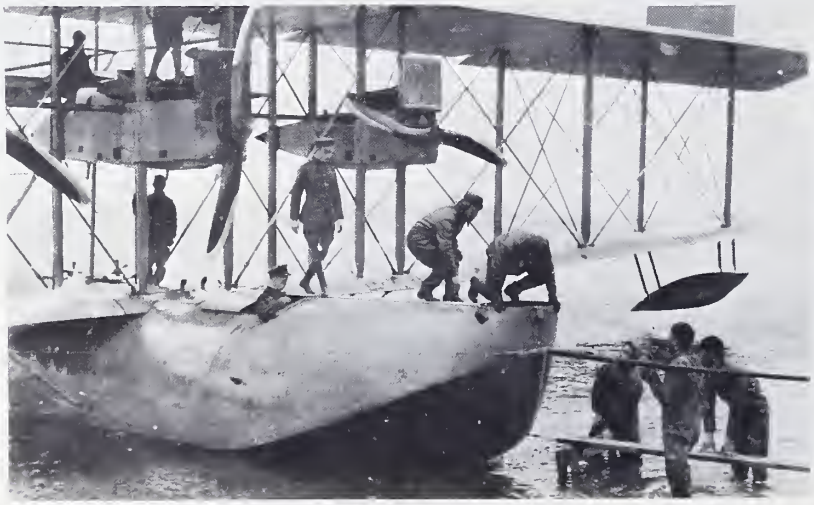
CURTISS R6L DROPS TORPEDO IN SAN DIEGO HARBOR

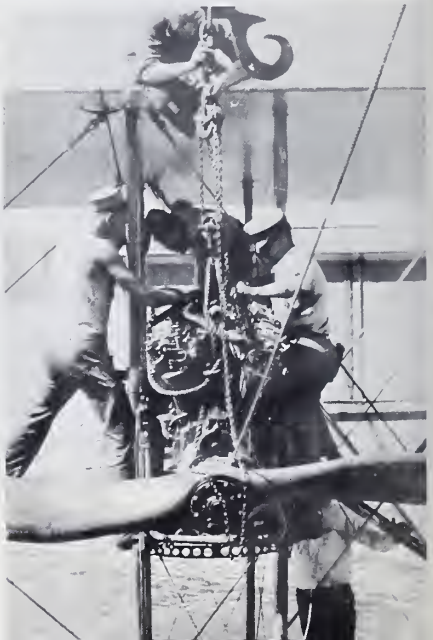
DH-4, ANOTHER BRITISH DESIGN, WAS BUILT FOR NAVY BY DAYTON-WRIGHT

GIANT FLYING BOATS

As a result of wartime requirements for an antisubmarine aircraft capable of flying the Atlantic, the NC seaplanes emerged as the largest flying boats of their time. Developed by Naval Constructors in cooperation with the Curtiss Aeroplane and Motor Corporation, the first (NC-1, right) was completed in September 1918, flew in October, and on November 27 carried a record 51 men into the air (below). Of the ten NC's built, three four-engined versions attempted the postwar trans-Atlantic flight; the NC-4 succeeded in May 1919. While most later NC's had three engines, the NC-9 was configured in a manner similar to the NC-4. Final flights were made in 1922.







THE NC-2, WITH TWIN TANDEM ENGINES, IN APRIL 1919

AT BUFFALO: *Rear, L to R: beach boy, dear old Bill, Woodhouse (advisor), Rodman, Fuller, McCormick, Depew, Potter, Knox, Otis, Lufkin, Goodyear, Scratt (instructor), Schieffelin, Farwell (1st Yale); front: beach boy, De Cernea and Chip, Smith (mech), Smith, and Hawkins.*

THE SECOND YALE UNIT

The story of the First Yale Unit and the accomplishments of its members are well known. Few know that there were also Second and Third Yale Units. A change in Navy policy prevented the Third from completing its training as a unit and only a narrow margin separated the Second from the same fate. But, like its earlier and larger counterpart, the Second completed its own training under Navy supervision and its members served in many capacities at home and abroad, compiling a record equally embellished with promotions and citations. This is its story as told by one of its members.

By RAdm. J. J. Schieffelin
USNR (Retired)

EARLY IN 1917, the Kaiser's U-boats were sinking Allied merchant ships in the North Atlantic faster than new ones were being built. The lifeline of the Allies, England, France and Italy, was in mortal danger.

In February, Admirals Robert E. Peary and Bradley A. Fiske visited the Yale campus, describing to groups of students the submarine peril and pointing out how useful Naval Aviation could be as a counteracting force. A group of 11 undergraduates, ten of them sophomores and one a freshman, plus two recent graduates, were fired with ambition to serve as "the eyes of the Navy," a phrase used by the Admirals. They decided to form, under the leadership of Ganson Goodyear Depew of Buffalo, N.Y., one of the sophomores, a unit styled "Aerial Coast Patrol Unit #2." In doing this they were following the example set by the already existing "Aerial Coast Patrol Unit #1," organized by F. Trubee Davison in 1916.

The idea was presented by Depew to CNO, Admiral W. S. Benson, who approved it and caused orders to be issued to all members of the group to report for training to Lt. Wadleigh Capehart, Naval Aviator No. 19, at Buffalo, N.Y. The members of the unit enlisted in the United States Naval Reserve as seamen, second class, on April 16, 1917, just ten days after the declaration of war. Capehart was on duty in Buffalo, supervising the production of naval aircraft at the Curtiss aeroplane factory. The cost of instruction and equipment came mainly from private sources.

Lt. Capehart was a godsend. He

treated the enthusiastic sophomores with amused tolerance, never losing sight of their dedication and potential. He displayed practical common sense in persuading Curtiss to admit the unit members as temporary factory hands. This enabled them to learn the essentials of aeroplane construction. This apprenticeship, combined with periods at the factory at Hammondsport, N.Y., where the OX and OXX motors were manufactured, constituted their grounding in technical fundamentals. Manuals, pamphlets and textbooks, sent up from NAS Pensacola, completed the indoctrination.

The unit lived in tents behind a rented seaplane hangar on the Lake Erie shore of the city of Buffalo, the location being protected by a breakwater providing smooth water for takeoffs and landings.

Flight operations, using a second-hand Curtiss F boat, began on Decoration Day, May 30, 1917, with misfortune. The flight students were being given initial short hops, going in alphabetical order for a ride with their first instructor, Fred Zimmer, at the controls. On the fifth flight, the F boat crashed, causing Zimmer's death and such serious injuries to his passenger, Seymour Knox, the freshman member, that he was eliminated from further participation in the war.

It was only through prompt action that Ganson Depew saved the unit from oblivion. The crash caused naval authorities to consider abolishing the unit and sending its members to the new ground school at MIT in Boston. However, Depew obtained the services of Harold Kantner, a well-known civilian flying boat pilot with 1,500 hours flying time, a fabulous score in 1917; wangled the purchase of a brand-new flying boat; and succeeded in persuading Adm. Benson to allow the continuance of training in Buffalo.

Ganson Depew, the organizer and acknowledged C.O. of the unit, was a young man with so forceful a personality, supplemented by extraordinary powers of persuasion, good looks and charm of manner, that he might very possibly have achieved his ambition to become President of the United States had not his life been cut short by illness in 1924. In the Navy, his administrative talent, spotted early, resulted in his being kept in the United States throughout the war. At Pensacola he was quickly promoted to lieutenant, junior grade, and he ended the war as Exec and acting C.O. of NAS Hampton Roads.

"Gans" Depew projected his ideas in a way that made the listener want to go along with him. It was not only the national emergency that produced the almost miraculous approval of the conservative and cautious CNO, Adm. Benson, and continued this support when disaster struck the unit on May 30. It was Gans' silver tongue, concise presentation and irresistible enthusiasm that carried the day. He was the Trubee Davison of the Second Yale Unit. Thus the 12 remaining members of the unit completed training in October 1917, passing all the exams sent up from Pensacola and successfully taking the flight tests with considerable gusto.

The "payoff" in the test for qualification for Navy Wings was to take the F boat up to almost its ceiling, 6,000 feet, cut the switch and glide down in a spiral, then to cause the aircraft to fetch up without power within 20 feet of a marker buoy. While at other schools the distance allowed from the buoy was 100 feet, the tests at Buffalo required that the nose of the F boat be within 20 feet of the mark. All 12 of the unit were successful, three actually nosing against the buoy.

In November 1917, after receiving commissions as ensigns, USNRF, five of us were immediately ordered overseas, six to Pensacola, and one to Washington, D.C. Two of the Pensacola contingent were sent abroad a few months later.

The first five, after reporting at Admiral W. S. Sims' headquarters in London, were detailed to Moutchic, France, for bombing practice in French FBA flying boats. Upon arrival at Moutchic, the green aviators found the beach where the new air station was located, close to a lake, littered with the wrecks of FBA flying boats.

Discreet inquiries disclosed that these aircraft, equipped with *rotary* Clerget motors (the whole motor revolving with the propeller around a stationary shaft) apparently had a tendency to spin in when doing a turn to the left. The new Yale pilots survived this phenomenon by executing flights that involved nothing but right turns, wherein the powerful torque caused by the whirling motor tended to work against the bank of the aircraft rather than accentuating it into a spin. It proved feasible to carry out the bombing exercises without ever turning left. After a few weeks, three were ordered to the Royal Naval Air Station at Felixstowe, England, and two to the U.S. Naval Air Station at Dunkerque, France.

Ens. Stephen Potter was in the Felixstowe contingent and soon became second pilot to an excellent Canadian, Flight Lieutenant Norman Magor. Potter specialized in gunnery, being on the practice range at every opportunity, learning precision in "leading the target." This paid off in March 1918 when he shot down a German two-seater seaplane, probably a Friedrichshafen, in an aerial duel off the north coast of Holland. Potter was flying a British F2A flying boat, like our H-16's, against a German biplane seaplane with two pontoons. Since the airspeed of the two planes was apparently equal, they flew along side by side on parallel courses, shooting at each other. Potter's gunnery was better than the German's; the seaplane caught fire and plunged into the water. A few weeks later, on April 25, Potter and Magor's flying boat was shot down in flames by seven Brandenburg monoplane seaplanes that flew at 100 knots, a decisive advantage over the 80-knot flying boat.

Potter's death, the first fatality in the unit, changed the attitude of its members from one of being on an adventurous lark to one of grim determination to win.

About the Author

J. J. Schieffelin, Class of 1919, Yale, and Naval Aviator No. 124, served overseas during WW I from late 1917 until after the Armistice. After a brief assignment to the training station at Moutchic, he served at Felixstowe and later at Killingholme from which bases he flew patrols over the North Sea and was an active participant in the antisubmarine campaign.

In WW II, he served from February 1941 through June 1946 with assignments involving training of AvCads at NRAB Atlanta and AVS and ACI officers in the indoctrination school at NAS Quonset Point, duty on the staff of ComForward Area, Central Pacific, and, in the post-war period, further staff duty in Japan. He was placed on the retired list, USNR, with the rank of Rear Admiral in 1959.

CURTISS F BOAT, THE TYPE IN WHICH THE UNIT WAS TRAINED AT BUFFALO, N. Y.

The pilots at Felixstowe were privileged in that they were at the Royal Naval Air Station where the two-engine flying boats, perhaps the finest invention in WW I, were perfected by Wing Commander J. C. Porte, RN. He started with the pre-WW I *America* flying boat designed by Curtiss to attempt a trans-Atlantic flight. It had been purchased by the British at the outbreak of the war in 1914. Porte improved the Curtiss boats with better shaped hulls, more power, and better flight characteristics. The ultimate F2A flying boats (F for Felixstowe) were not only seaworthy, but they could also do routine patrols lasting five hours, carrying two 230-lb. depth bombs and armed with up to six Lewis machine guns. With a cruising speed of 60 knots, a maximum speed of 80 knots and a landing speed of 45 knots, these aircraft were the workhorses of the North Sea patrol, flying thousands of convoy escort patrols, plus many a search and long-distance reconnaissance mission.

It was at Felixstowe that "lighter stunts" originated. The radius of the flying boats was limited to a maximum of seven and a half hours in the air, covering 450 miles. Since the distance from Felixstowe to the Danish coast northwest of Heligoland was 340 miles, the aircraft could not fly reconnaissance missions far enough to sight ships making sorties from Germany northward, up the coast of Denmark.

To overcome this deficiency, Wing Captain C. R. Samson, RN, and Wing Commander Porte together devised a lighter that could carry an F2A flying boat and be towed at high speed by a destroyer. These lighters were in use in the spring of 1918 and American pilots were selected to take part in several of the "lighter stunts." The flying boats were placed aboard the lighters in the evening, the air crews going aboard the destroyers which furnished the towing.

The formation of three destroyers, each towing an F2A sitting on a lighter, crossed the North Sea at 30 knots to a point north of the Dutch coast. Before dawn, the aircrews were put aboard the lighters to man their aircraft which were then offloaded from the lighters. Motors were started, warmed up, and the three-seaplane patrol took off, if sea conditions permitted, which they did more often than not. Thus, patrols were flown to within sight of the Danish coast, Blaavand Point usually being sighted. The F2A's made it back across the Bight of Heligoland to Holland and thence to Felixstowe, landing with fuel tanks almost dry.

These flights were highly regarded at Felixstowe, especially by the Americans. The Admiralty liked them, too.

The two pilots at USNAS DUNKERQUE, where they reported to Lt. Artemus L. Gates, USNR, of the first Yale Unit, and later Assistant SecNav for Air, were Ensigns Edward de Cernea and Traver Smith. "Shorty" Smith flew fighters with British Air Squadron 213 and earned promotion to lieutenant, junior grade, in December of 1918.

"Eddo" de Cernea was attached to French aviation and distinguished himself in antisubmarine and other missions to such a degree that France showered him with honors. He was seriously injured in a crash in August 1918. This writer has no knowledge of the work that earned him such appreciation from the French, but he does know that the population of Dunkerque literally idolized de Cernea. On a special mission to Dunkerque shortly after the crash, "Eddo" de Cernea was discovered in a hospital cot in a room banked from floor to ceiling with flowers brought in by the French people of Dunkerque to cheer him up. A voice from underneath a mass of bandages that covered his face came from him, saying "I'm O.K., no kiddin'." That was true. He made it home later in pretty fair shape.

ENS. J. Sanford Otis, who went overseas with Ens. Alexander McCormick in June 1918, flew with the Northern Bombing Group, under LCdr. Robert A. Lovett, USNRF, of the first Yale Unit, who became Secretary of Defense in 1951.

"Shorty" Otis, who was extra tall, also made two successful trips ferrying Italian Caproni bombers from Italy over the Alps to northern France. It is a wonder he lived to tell the tale, for these planes were faulty and caused many casualties. Luck had to be combined with skill to fly one over the Alps.

Ltjg. McCormick, after being in charge of a division at Pensacola, also flew two Capronis up from Italy and was then assigned to RAF Squadron 214, flying bombing missions from Calais in large British bombers. Upon returning from one of these flights, his plane crashed in a forced landing at night. He survived the impact, got safely out of the plane, and was running forward to aid the pilots caught in the wreckage of the nose when he was struck by the blade of a propeller still rotating in the darkness. His death was the direct result of his effort to help his British friends.

Ens. Percival S. Fuller, known as "Perce," had the oddest adventure in the record of the unit. After instructing at Pensacola and making lieutenant, junior grade, he went to NAS COCO SOLO, C.Z., where he became squadron commander. While taxying a float seaplane in a lagoon, his plane was drawn irresistibly toward a waterspout. The pilots jumped overboard when the plane was whirled upward by the spout which then collapsed, dropping the plane back into the water in a wrecked condition. This episode was not held against "Perce," who was promoted to lieutenant in Dec. 1918.

Ens. Chauncey Lufkin, Yale '15, with an engineering degree, was first assigned to the Bureau of Steam Engineering in Washington, D.C. In April 1918, he went to Moutchic where he was injured in a crash in August. He finished the war at Naval Aviation Headquarters in Paris and was pro-

moted to jaygee in October, 1918.

Frank H. Goodyear, also with an engineering background at Yale in the Class of 1916, after instructing at Pensacola, was assigned to NAS San Diego, Calif., as navigation officer.

Ens. Clifford Rodman, a hard-driving Chicagoan, rose during 1918 to the position of C.O. of the Service Flight School at NAS Pensacola, and was promoted to lieutenant, junior grade, on May 20 and to lieutenant on July 1. He was four times recommended for lieutenant commander.

The ablest natural pilot in the unit was Ens. Ashton W. Hawkins from El Paso, Texas. A sandy-haired, tall, wiry westener, he soaked in every drop of information during training and became an artist in the handling of flying boats. He was one of the pilots assigned to Felixstowe whence he went on to Killingholme, where he reported for duty to Cdr. Kenneth Whiting in June 1918. "Tex" was credited by Adm. Sims with having done more war flying than any other U.S. Navy pilot working from North Sea bases. His feats at Felixstowe included going out in stormy weather, in fog, at night, and truly made him an all-weather pilot before all-weather flying was considered feasible. He also went on several "lighter stunts" and this experience qualified him, in Whiting's opinion, for the most difficult assignments.

On one occasion, for example, he was assigned to hunt for a Zeppelin airship reported to be headed for the Killingholme area. With Ltjg. G. Francklyn Lawrence, of the first Yale Unit, as his second pilot or navigator, with a radioman and a machinist's mate, he took off in an H-16 flying boat at midnight in a tempest of wind and rain. "Tex" flew "by the seat of his pants" up through the rough air until the flying boat emerged into the clear above the clouds at close to the aircraft's ceiling, 10,000 feet. There was no moon and they searched the starry skies for signs of a Zeppelin. A reddish speck close to the cloud horizon attracted their attention and they headed for it, believing it might be the exhaust glow of a Zep's motors. After maintaining this heading for some 30 minutes, both pilots agreed that the speck was the planet Mars. After several hours of fruitless search, as dawn was breaking, they dove into the overcast, heading westward for England, but with no idea of where they had drifted in the high winds.

Levelling off just above the waves in thick fog, ceiling zero, they continued westward. They sighted close aboard a British trawler, followed by another and again another. Altogether, they counted seven trawlers steaming in column. Lawrence deduced that, being in such neat formation, these little ships might be leaving a port, so they flew along the reverse course astern of the trawlers. A rock breakwater loomed up in front of them. They hopped it and made a landing in the smooth waters of a harbor. Taxying forward, there loomed, dead ahead, a seaplane ramp, back of which could be dimly seen the gaping open front of a seaplane hangar!

At the ramp, their flying boat was hauled up onto the concrete apron, where an amazed British duty officer greeted them with the question: "However did you find this place in this weather?" With a slow smile, Tex replied: "They taught us to navigate in the United States."

They were at the Royal Navy air station at South Shields, near the mouth of the river Tyne, 80 miles northwest of Killingholme, the only seaplane station on the coast for many miles in either direction. Moreover, there are many rocky cliffs girding the nearby coasts. Luck combined with quick thinking got them there. So, we can brag that on a stormy night in 1918, two Navy pilots, one from each of the two first Yale Units, unwittingly set a course for Mars, which even the most advanced astronauts have not yet tried to do. Our boys did not make Mars, but they did make it back to base—or, rather to *a* base.

All but one of the members of the unit earned promotion. Some, Depew and Rodman in particular, received assignments of great responsibility. The ones who went overseas earned the respect of the British and the French.

Four were awarded Navy Crosses (two posthumously). De Cernea was made a Chevalier, Legion d'Honneur, given a French Army citation, and awarded a Croix de Guerre with palm. A destroyer was named "McCormick" and another "Stephen Potter."

By and large, Yale Aerial Coast Patrol Unit #2, the kid brother of Trubee Davison's renowned Unit #1, is well able to stand on its record.

GANSON G. DEPEW

STEPHEN POTTER

EDWARD de CERNEA

ALEXANDER A. McCORMICK, JR.

AT THE TURN OF THE YEAR

The growth was accelerating and Naval Aviation was gaining stature and recognition. Training programs were adjusted to war needs, new aircraft were delivered, more stations were put into operation and the coverage of war patrols was extended.

NAS FROMENTINE, FRANCE; CONSTRUCTION BEGAN IN FEBRUARY

JANUARY 1918

1—The Experimental and Test Department at Pensacola was transferred to the air station at Hampton Roads to overcome difficulties arising from the remoteness of Pensacola from principal manufacturing and industrial plants in the northern states.

1—NAS DUNKIRK, France, was commissioned with Lt. Godfrey deC. Chevalier in command.

7—Progress in building H-16 flying boats at the Naval Aircraft Factory was marked by the start of planking the first hull.

19—NAS ANACOSTIA was established to provide a base for short test flights, to provide housing and repair services for seaplanes on test flights from Hampton Roads and Langley Field, and to display new seaplane types for study by men working in Navy Department offices concerned with their construction and improvement.

21—The First Marine Aeronautic Company, Capt. F. T. Evans commanding, arrived at Naval Base 13, Ponta Delgada in the Azores, to establish a base from which it would fly antisubmarine patrols. It was the first American aviation unit completely trained and equipped to be sent overseas.

24—Specifications and blueprints drawn up by the Bureau of Construction and Repair for the Davis gun carrier were received at the Naval Aircraft Factory. Later designated N-1, this was the first airplane designed and built by the Navy for the attack role.

25—The Supervisor, Naval Reserve Flying Corps, requested that Dr. Alexander McAdie, Director of Blue Hill Observatory, Harvard University, be enrolled as a lieutenant commander in the Naval Reserve and assigned to the Aviation Office in CNO to direct the establishment of a Naval Aerological Organization.

28—A group of 50 enlisted men from Pensacola reported to the Naval Aircraft Factory for training in aircraft repair prior to assignment overseas.

During January, NAS CHATHAM, Mass., was commissioned with Lt. E. H. McKitterick in command.

FEBRUARY

1—The first H-16 flying boat assigned to operational service was delivered to the air station at Hampton Roads. A twin-engine tractor biplane built by Curtiss and the Naval Aircraft Factory, the H-16 was used on antisubmarine patrol from stations on the East Coast and in Europe and for that purpose was equipped to carry two 230-pound bombs and five Lewis machine guns, one forward, two aft and two amidships.

3—Aerial gunnery training for prospective Naval Aviators and enlisted men began under RCAF instructors at the Army field at Camp Taliaferro, Fort Worth, Texas. Although the program was of short duration, 38 officers and 80 enlisted men completed the course before its closing on 16 March 1918.

8—A change in national aircraft insignia was promulgated to the Navy. It discarded the white star design and replaced it with concentric circles of red and blue around white and reversed the order of the red, white and blue vertical bands on the rudder, placing the red nearest the rudder post.

10—The Marine Aeronautic Detachment, Capt. Roy S. Geiger commanding, transferred from Philadelphia to Miami to set up a Marine Flying Field for landplane training adjacent to the naval air station.

13—Lt. G. C. Dichman took command of the air station at Brest which served as a base for seaplane and kite balloon operations and an assembly plant for aircraft shipped overseas. This is considered the beginning of NAS BREST.

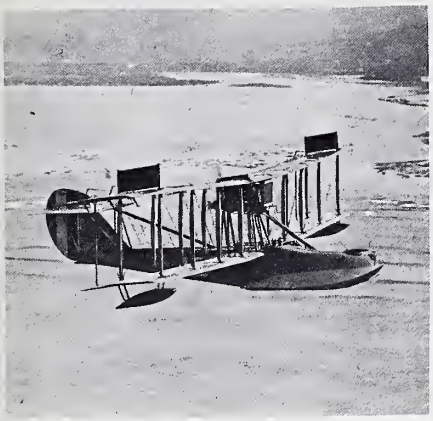
21—NAS BOLSENA was commissioned with Ens. W. B. Atwater in command. The first of two stations established in Italy, Bolsena was used primarily for training.

22—The Director of Naval Communications was requested to provide wireless transmitting and receiving equipment at five naval air stations on the Atlantic coast and at San Diego and Coco Solo to permit pilots on patrol to communicate with their bases.

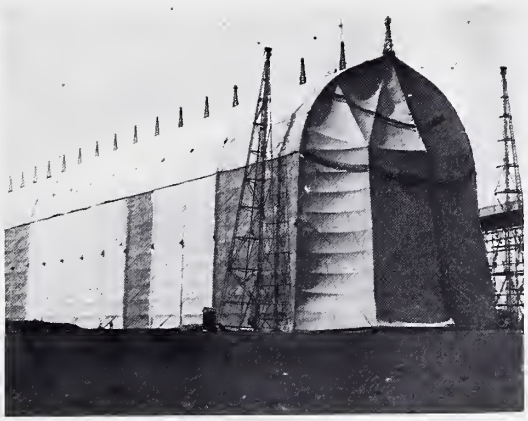
22—NAS QUEENSTOWN, an assembly and repair station serving all naval air stations in Ireland, was commissioned with LCdr. P. J. Peyton in command.

26—The Chief of Naval Operations established an aerographic equipment allowance list for air station abroad.

28—The President issued a Proclamation, effective in 30 days, prohibiting private flying over the United States,



HS-2 PATROLLED AT HOME AND ABROAD



THE CANVAS BLIMP HANGAR AT NAS PAIMBOEUF

CAPT. F. T. EVANS, USMC

its territorial waters and its possessions without a special license issued by the Joint Army and Navy Board on Aeronautic Cognizance.

MARCH

1—The dirigible station at Paimboeuf, where a number of aviation personnel had been on duty with the French since November 1917, was taken over by American forces and commissioned as a Naval Air Station, LCdr. Louis H. Maxfield in command.

3—The AT-1 (Astra Torres) blimp, acquired from the French two days before, made its first flight under American control at Paimboeuf.

4—A seaplane, piloted by Joseph Cline with F. Lovejoy as observer, started on patrol from NAS LeCroisic and, just as the plane took off, the port bomb fell into the water and exploded, also setting off the bomb under the starboard wing. The blast cut the flying boat completely in two just aft of the cockpit but neither the pilot nor the observer was injured.

6—The Bureau of Navigation established navigation instrument allowances for naval aircraft, allotting a compass, two altimeters and a clock for service airplanes; a compass, altimeter, clock and statoscope for blimps and free balloons; and an altimeter and clock for kite balloons and training planes.

6—An unmanned flying bomb was successfully launched by a falling-weight type catapult and flown for 1,000 yards at the Sperry Flying Field, Copiague, Long Island.

7—The Office of the Director of Naval Aviation was established and the status of aviation was raised from a section to a division of CNO.

9—A revised flight training program was initiated which divided the syllabus into elementary, advanced and advanced specialization courses; it designated the stations at which each would be given, and provided that, after a period of general training, all students would specialize in one of three general types of seaplanes.

14—NAS Ile Tudy, France, was commissioned with Lt. Charles E. Sugden of the Coast Guard in command.

15—Warrant Officer Ward of the Royal Navy Flying Corps arrived at the Naval Aircraft Factory to deliver plans for the F-5 flying boat that had been developed at Felixstowe, England, and which, after modification, would be used by the Factory to build the new boats.

16—The first HS flying boat assigned to service was delivered to the air station at Miami. A single engine pusher biplane built by several companies from a Curtiss design in both HS-1 and HS-2 configurations, the HS was used in coastal patrol and was the first of the American-built planes sent overseas.

18—The Receiving Ship of the Naval Air Detachment at MIT went into operation with accommodations for 300 men who would receive indoctrination and preliminary training prior to their assignment to Ground School.

19—As combat operations underlined the need for aviation intelligence officers, Commander Naval Aviation Forces, Foreign Service, defined the functions and duties performed by such officers at Royal Navy Air Stations and suggested that similar services be provided at U.S. Naval Air Stations "as may seem expedient."

19—A formation of flying boats, on long-range reconnaissance of the German coast, was attacked by German seaplanes. Ens. Stephen Potter shot down one of the attackers and was officially credited as being the first American Naval Aviator to shoot down an enemy seaplane.

21—The HA seaplane, or Dunkirk fighter, made its first flight at Port Washington, Long Island, with Curtiss test pilot Roland Rohlfs at the controls and Capt. B. L. Smith, USMC, occupying the second seat.

25—Ens. John F. McNamara, flying out of RNAS Portland, England, made the first attack on a German U-boat by a U.S. Naval Aviator. His attack, although successful enough to warrant the commendation of Admiral Sims, was later evaluated as "possibly damaged."

27—Only 228 days after ground was broken for the Naval Aircraft Factory, its first product, an H-16, made its first flight. A few days later, this plane and another were shipped overseas.

30—The Curtiss 18-T or Kirkham triplane fighter was ordered from the Curtiss Engineering Corporation. This single-engine, two-seat landplane was fitted with two synchronized and two flexible guns.

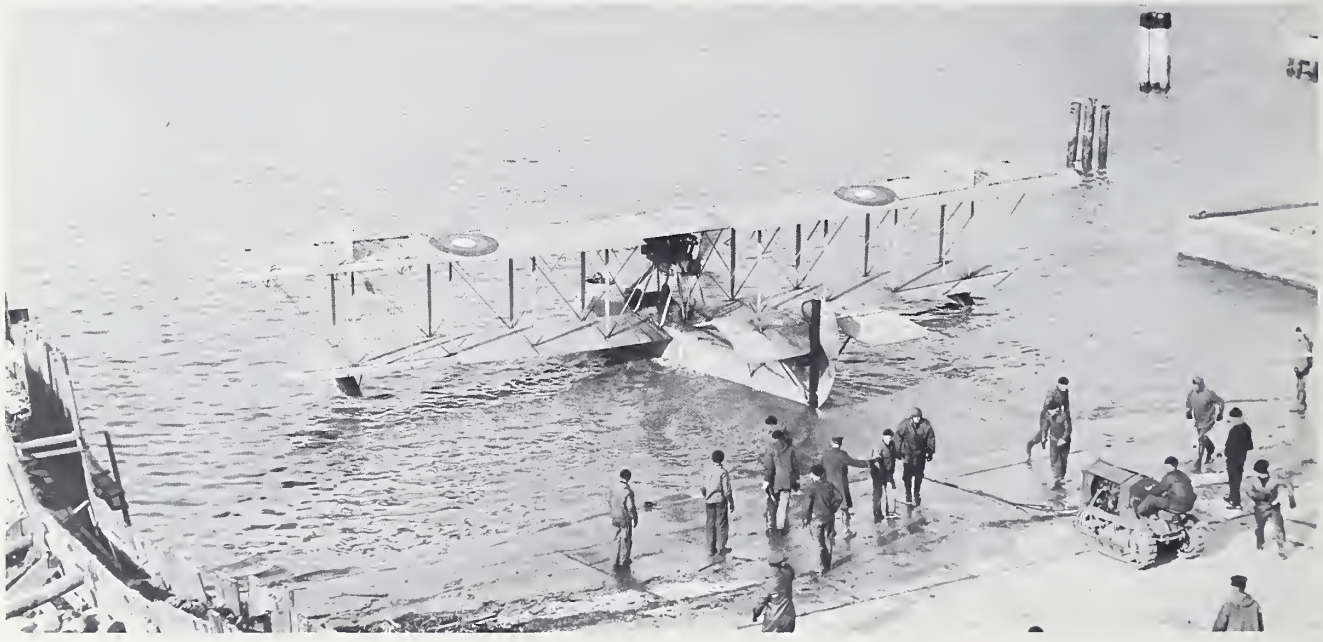
30—A requirement was established for weekly reports from commanding officers of all air stations in the U.S. of weather conditions experienced in flight operations.

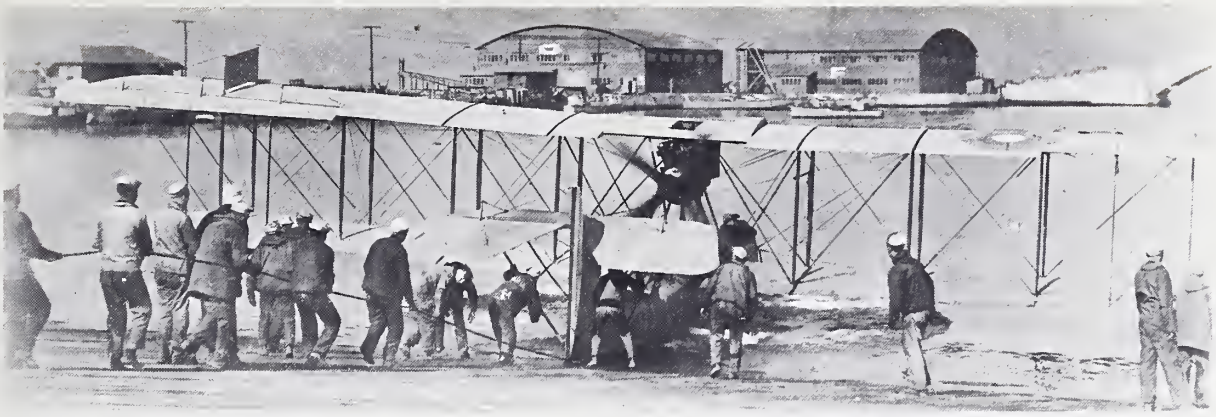
NATIONAL MARKINGS IN WW I

May 19, 1917, the first United States national insignia for aircraft was described in General Order 299 and ordered placed on all Navy aircraft. The design called for a red disc within a five-pointed white star on a blue circular field. Rudders were marked with vertical red, white and blue bands with the blue band forward, nearest the rudder post. The color shades were the same as those of the American flag.

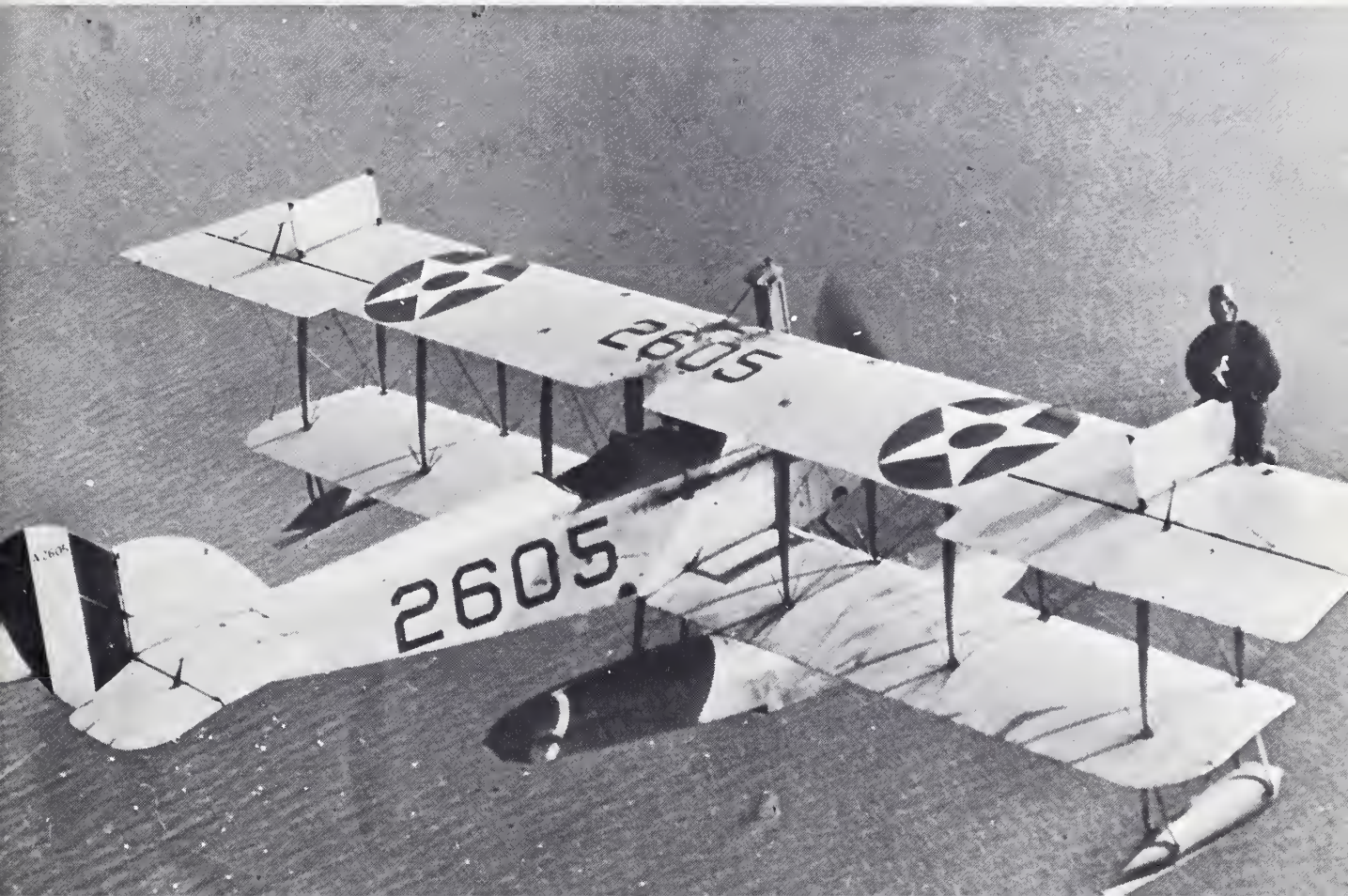
February 8, 1918, the roundel was adopted by the United States "to avoid confusion with enemy markings and to conform with Allied markings." Britain, France and Italy all used a variation of the roundel. The U.S. roundel consisted of concentric circles of red and blue around a white ball. Tail band colors were reversed, with the red band nearest the rudder post.

In August 1919, the Secretary of the Navy ordered that naval aircraft markings revert to the 1917 star insignia and that the tail bands again be reversed with the blue band nearest the rudder post.





AS A RESULT *of General Orders which changed U.S. markings during WWI, prepainted parts might appear on aircraft of a different period. HS-2, top, has only one roundel in evidence; tail stripes are reversed. Above, N-9 has 1918 roundels but 1917 stripes. N-9, below, has correct markings for period after August 1919. Researchers' problems are complicated by photographs in which the tonal density of red and blue colors is not always consistent, as in photographs above.*



AFTER ONE YEAR OF WAR

QUESTIONS of mission were discussed at high levels as plans were formulated for a Navy land-based air offensive against German U-boat support facilities. Navy and Marine Corps units destined to take part began organizing: Flight training goals were adjusted to the new requirement. Trained aerologists began their duties at air stations. American-built aircraft and engines began arriving overseas.

APRIL 1918

1—The First Aviation Squadron transferred from Gerstner Field, La., to the Marine Flying Field at Miami.

10—A training school for women apprentices began at the Naval Aircraft Factory.

15—The Marine Aeronautic Detachment and the First Aviation Squadron were merged at Miami to form the First Marine Aviation Force under command of Capt. Alfred A. Cunningham, USMC.

16—The first formally trained Navy aerologists, a detachment of nine officers and 15 enlisted men headed by LCdr. A. G. McAdie, departed for duty at naval air stations in Europe.

17—Lt. W. F. Reed, Jr., reported to NAS PENSACOLA to provide meteorological services for flight operations or for what was then called "aerographical" duty.

23—A section of planes from NAS ILE TUDY, one manned by R. H. Harrell, QM1c(A), and H. W. Studer, QM2c(A), the other by Ens. K. R. Smith and O. E. Williams, attacked a submarine stalking the convoy they were covering. The plane piloted by Ens. Smith dropped two bombs which brought bits of wreckage and sea growth to the surface and appeared so effective that the second plane did not follow-up the attack. Ens. Smith and observer Williams were officially credited by French naval authorities with having sunk a submarine, were cited in the Order of the Day and awarded the Croix de Guerre with Palm.

23—The first shipment of *Liberty* engines to naval aviation units in France was received at the assembly and repair station, NAS PAUILLAC.

27—The airship AT-1, commanded by Lt. F. P. Culbert, and a crew made up of Ensigns M. P. Delano, A. D. Brewer and T. E. McCracken, completed a 25-hour, 43-minute flight out of Paimboeuf, France, during the course of which three convoys were escorted through a mined zone. For this flight, the longest then on record for airships of this type, the commanding officer and crew were officially commended by the French Minister of Marine.

29—The RAF kite balloon station at Castletownbere, Ireland, was turned over to the United States and commissioned an NAS with Ens. C. E. Shumway in command.

30—The Secretary of the Navy approved a plan, recommended by the General Board and developed by the U.S. Naval Forces in Europe, for air operations in the Dunkirk-Zeebrugge area against German submarine support facilities by a specially organized unit, later designated the Northern Bombing Group, and directed that bureaus and offices expedite assembly of personnel and equipment.

MAY

2—Naval Air Station, Wexford, Ireland, a seaplane station located at the southern entrance to the Irish Sea, was placed in commission.

6—The Naval Air Station Coco Solo was commissioned, Lt. R. G. Pennoyer commanding, as a base for seaplane patrol over the approaches to the Panama Canal.

15—The Bureau of Steam Engineering reported that the Marconi SE 1100 radio transmitter had demonstrated dependability in voice communication at distances up to 50 nautical miles and in code communication at up to 120 nautical miles. Initially designed for use in H-16 flying boats, this was one of the first radio sets widely used in, and the first tube set developed for, naval aircraft.

18—The Chief of Naval Operations scheduled training goals which called for 124 pilots and 62 gunners trained in night bombers by 1 July and 552 pilots and 156 engineers trained in H-16 and HS-1 patrol planes by 1 August. To meet them, it was directed that eight elementary training squadrons be formed, two at Key West, four at Miami

MAKING READY FOR THE FIRST FLIGHT OVERSEAS OF HS-1 AFTER IT WAS ASSEMBLED AT PAUILLAC

LT. HENRY BARTON CECIL

and two at Bay Shore and that six advanced training squadrons be organized at Pensacola where only advanced training would be given as soon as the elementary students on board were graduated.

22—Construction of the first N-1, an experimental seaplane, was completed at the Naval Aircraft Factory.

24—The first shipment of American-built planes, six HS-1's on board the USS *Houston* and two on board *Lake Placid*, was delivered at NAS PAUILLAC, France.

JUNE

4—The first DH-4's assigned to service were delivered to Miami. A two-seat, single-engine landplane built by Dayton-Wright and obtained from the Army by the Navy, the DH-4 was used principally by the Marines.

4—Naval Air Station L'Aber Vrach, was commissioned with Lt. Henry B. Cecil in command. Located on the rocky island of Ehre in the harbor of Vrach near Brest, its seaplanes covered the western English Channel.

5—The E-1, a single-engine pusher type airship, was ordered from the Goodyear Tire & Rubber Company.

8—Naval Air Station Arcachon, southernmost of the seaplane stations in France, was commissioned. Ens. J. N. Brown was acting commanding officer until June 15.

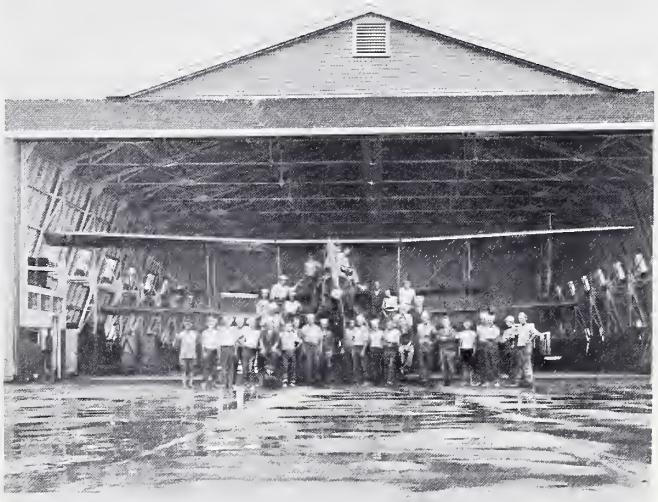
13—The first American-built aircraft to be assembled in France, an HS-1 made its first flight at NAS PAUILLAC, piloted by Lt. Charles P. Mason with Cdr. J. B. Patton and Lt. W. B. Jameson as passengers. This was also the first flight overseas of a *Liberty*-equipped plane.

16—A headquarters company and four landplane squadrons, designated A, B, C and D, were organized within the First Marine Aviation Force at Miami. Commanding officers of the new squadrons were Capts. Roy S. Geiger, William M. McIlvain, Douglas B. Roben and 1st Lt. Russell A. Presley.

19—The practice of taking regular upper air soundings began at NAS PENSACOLA to provide information on wind velocity and direction needed for navigation training flights. Recording instruments were carried aloft in a kite balloon, a technique developed by the station meteorological officer, Lt. W. F. Reed.

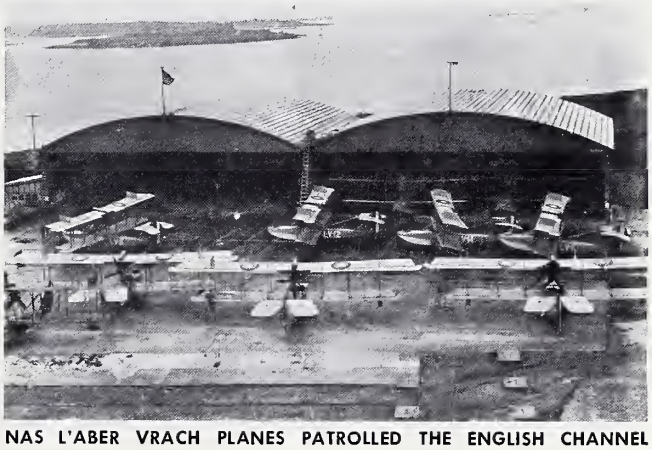
30—The first Navy pilots of the Night Wing, Northern Bombing Group, to take special training with British units marked the completion of their course by participating in a night bombing raid with RAF Squadron 214.

JENNIES OVER AD BUILDING AT MARINE FLYING FIELD, MIAMI



ENLISTED MEN AND CURTISS R TYPE SEAPLANE AT COCO SOLO

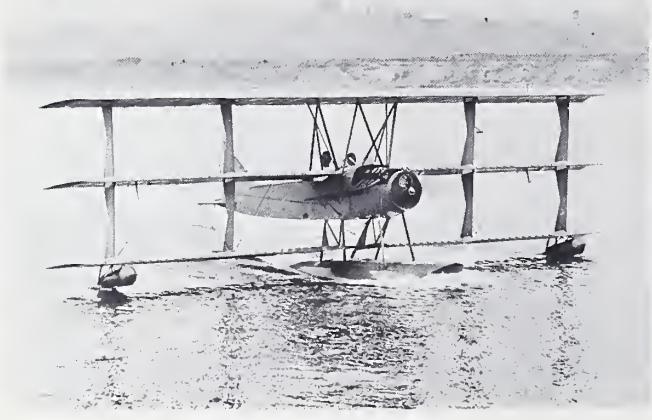
NAS ARCACHON, SOUTHERNMOST SEAPLANE STATION IN FRANCE



NAS L'ABER VRACH PLANES PATROLLED THE ENGLISH CHANNEL

RARE BIRDS

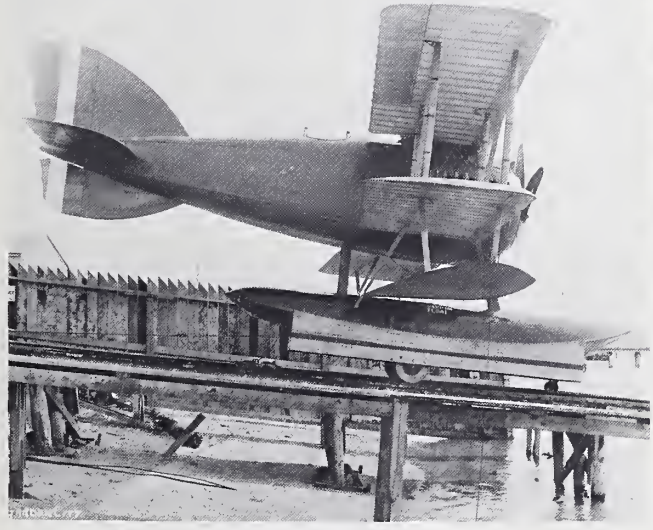
UNIQUE *among aircraft which did not go into wartime production was the Gallaudet seaplane. It featured a four-bladed propeller amidships driven by a Duesenberg engine. Above is 59-A at Pensacola in February 1917. Note the anchor design on the rudder, a frequent marking on naval aircraft before the war. Only one 59-A was accepted. Later, in March 1918, two similar craft (Liberty-powered D-4's) were tested. Gallaudet pilots included Richardson, Read, Mitscher, Stone, participants in 1919 trans-Atlantic project.*



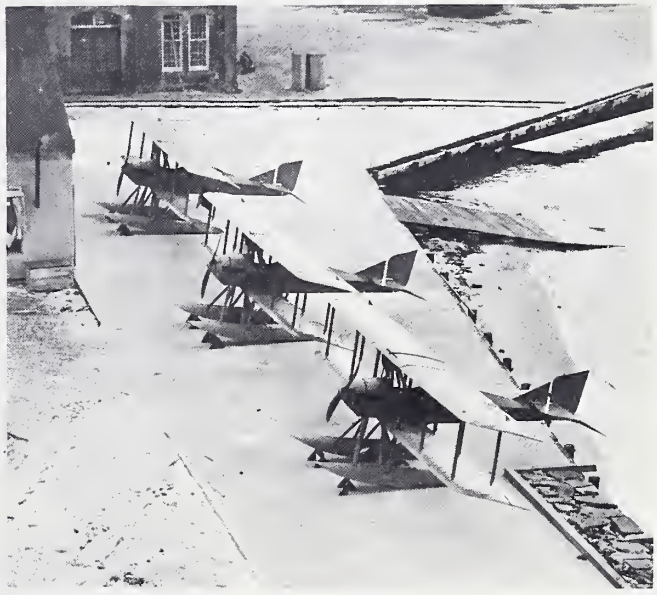
CURTISS L-2 TRIPLANE 'SCHOOL BOAT'

SPEEDY CURTISS 18-T 'KIRKHAM FIGHTER'

THOMAS-MORSE S-5 (L) WAS INFLUENCED BY SOPWITH 'BABY' FOR SCOUT AND TRAINING WORK



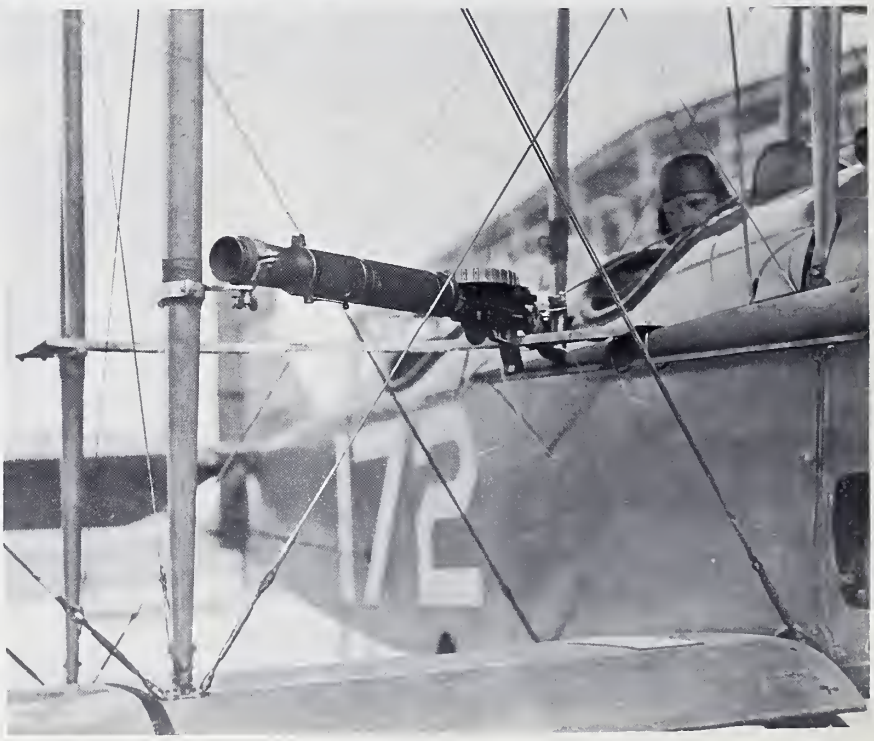
CURTISS HA WAS TWO-SEAT FIGHTER DESIGN



THE STURTEVANT FEATURED STEEL FRAMEWORK

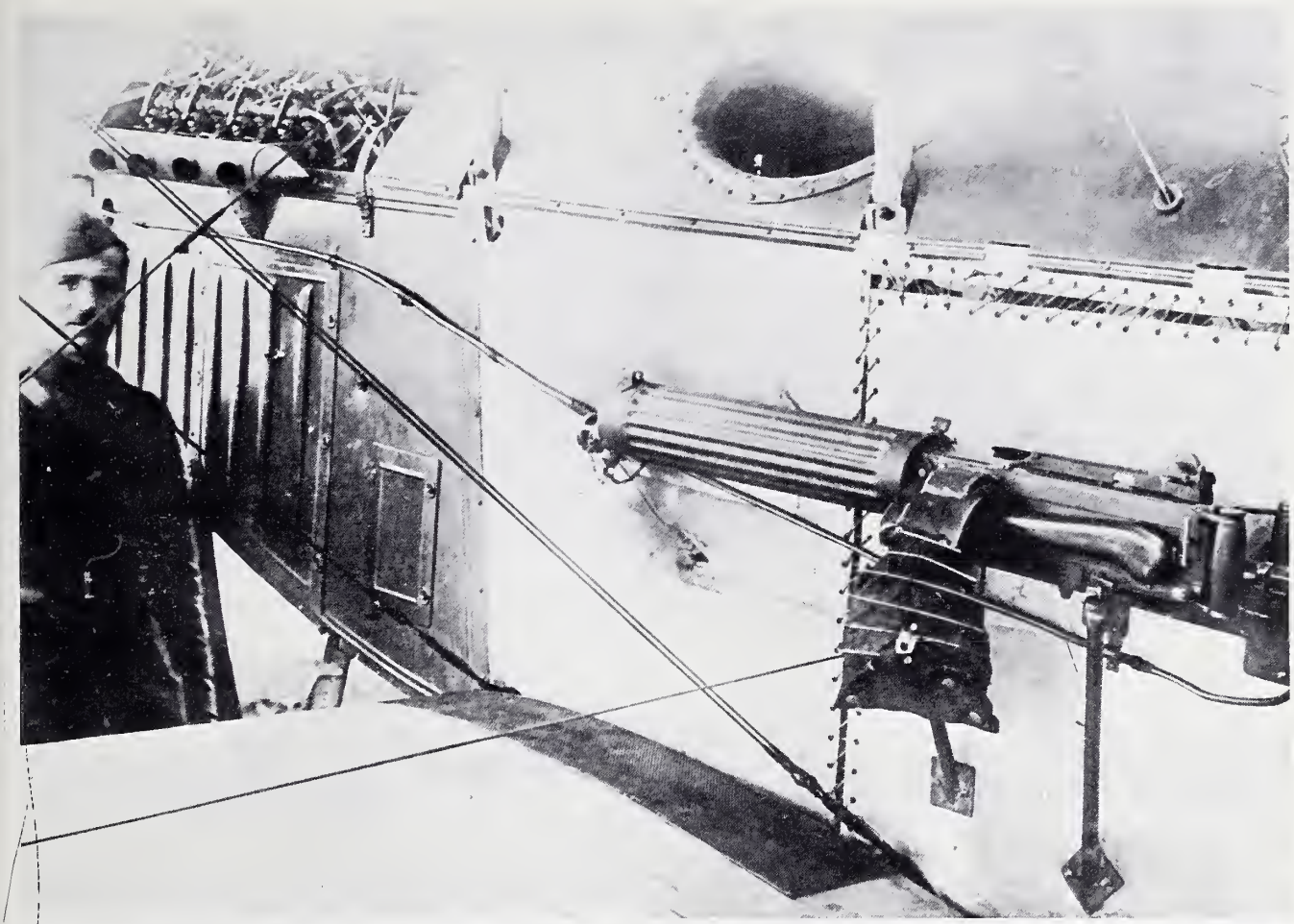
THE LEWIS GUN

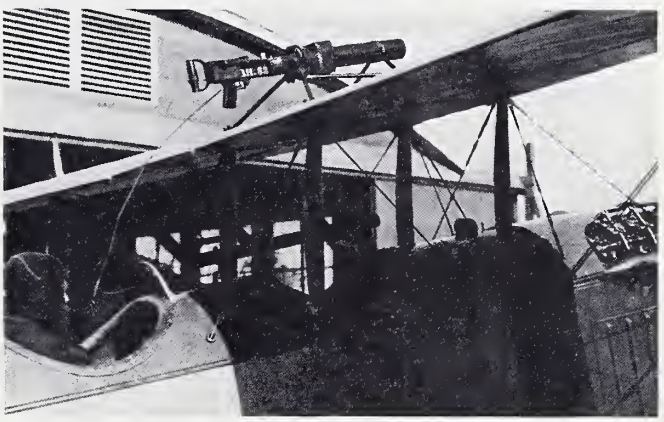
was reputed to be the best aircraft gun of the war. Shown above is a typical Lewis with the combination Norman rear ring sight and wind-vane front sight which provided both target and gunner's deflection angles. At right, water-jacketed Lewis was remotely controlled on swivel mount, fired outside propeller arc.



Get off a quick accurate burst, with the gun properly aimed, before the enemy does, and the combat is won.

—Notes on Aerial Gunnery, 1919





THE DAVIS GUN

shown at left with Lewis gun used for sighting, was in experimental stage, had potential for ASW. Photo at top shows synchronized Vickers gun used in training in Canada. Above is wing-mounted camera gun.

THE NAME SPERRY *is inseparably linked with the word gyroscope. Above, Elmer A. Sperry, inventor in the field of stabilization and radio control, holds a model. At left is his son, Lawrence, who worked with his father as an engineer and test pilot for the flying bomb in WW I.*

Developing the Flying Bomb

One of the antecedents of the guided missile, generally considered a WW II development, was the flying bomb of WW I. In 1936, over a decade after the WW I efforts lapsed, LCdr. D. S. Fahrney (now Rear Admiral, USN, Ret.) was assigned the task of developing radio-controlled target aircraft. Out of this effort emerged the assault drone of WW II, a forerunner of the modern missile. In developing radio-controlled target aircraft, Fahrney first reviewed at the Naval Research Laboratory the radio aspects of the flying bomb of WW I days and the early 1920's. Thus, the work done in WW I, as well as the experience acquired by NRL and the Sperry Gyroscope Co., contributed to the development of guided missiles. This article is based on RAdm. Fahrney's 'History of Radio-Controlled Aircraft and Guided Missiles.'

By Lee Pearson, Historian
Naval Air Systems Command

THE DEVELOPMENT of guided missiles was one of the more obscure and interesting areas of endeavor during World War I. Marconi's first successful wireless transmission in 1896 and the invention of the airplane less than a decade later opened the technological field of electronics and aviation. Of the many areas of utilization in which these two fields have merged, none is more obvious nor more complex than that of the guided missile.

Before WW I, the possibility of using radio to control aircraft intrigued many an able man. One of these, Elmer Sperry, succeeded in arousing the Navy's interest. Although his efforts were visionary, they also had a serendipitous effect and made contributions to such fields as automatic pilots, gyro-stabilized bombsights, flight instruments and catapults.

Sperry was, in many ways, the epitome of the Yankee inventor—with a college education added. His varied and widespread interests included mining machinery, automotive and street railways and electro-chemistry. By 1896, he had added to these an interest in gyroscopes which, during the next 15 years, he adapted to naval use —gyro-compasses for battleships and gyro-stabilizers for destroyers. In 1911, the application of radio control to aircraft intrigued him.

He realized at once that for radio control to be effective, automatic stabilization would be essential, so he again turned to the gyroscope as a promising device. Two years later, in the summer of 1913, the Navy provided assistance in the form of a flying boat, piloted by Lt. P. N. L. Bellinger, which was used to test and evaluate the gyroscopic stabilizer or autopilot. Elmer Sperry's son, Lawrence, served as engineer during these trials.

The next year, using an improved autopilot, Lawrence won a French prize of 15,000 gold francs. The instrument, though placed in production, proved to be too crude for operational use. On a second trip to Europe, Lawrence, observing the developing techniques of aerial warfare, became convinced that the gyroscope had many applications in military aircraft. Acting upon this recommendation, the Navy Department awarded contracts for the development of such diverse devices as a bombsight, a stable reference line (called a "base line indicator," but the forerunner of the turn and bank indicator) and a gyro-com-

pass. By 1916, the Sperrys had not only had five years of experience in attempting to develop aeronautical uses for gyroscopes but also had achieved some degree of success with their gyrostabilizers.

At this time, they temporarily joined Peter Cooper Hewitt to develop an aerial torpedo or explosive-laden, pilotless aircraft. Hewitt, best known as the inventor of the mercury vapor lamp, worked on other electrical and radio devices and contributed to the development of the vacuum tube. Thus by combining the ability of Hewitt in radio with that of the Sperrys in gyroscopes, early success was anticipated.

Hewitt and Elmer Sperry were both members of various committees of the Naval Consulting Board which Secretary Josephus Daniels had established in 1915 to provide "machinery and facilities for utilizing the natural inventive genius of Americans to meet the new conditions of warfare." Sperry belonged to four committees; Hewitt to three. They were both members of the Committee on Aeronautics and Aeronautical Motors, Elmer Sperry eventually succeeding to its chairmanship.

In the summer of 1916, Hewitt and Sperry arranged for a representative of the Navy's Bureau of Ordnance, Lt. T. S. Wilkinson, to examine their aerial torpedo. This torpedo consisted of a gyroscopic stabilizer, a directive gyroscope, an aneroid barometer to regulate height, servo-motors for control of rudders and ailerons, and a device for distance gearing. These were installed in an airplane which could be catapulted or flown from the water and would mount to a predetermined altitude, fly a pre-set course, and, after traveling a pre-set distance, drop its bombs or dive to the ground. Wilkinson reported that the aerial torpedo did not possess a degree of accuracy sufficient to hit a ship, but, because of its range of 50 to 100 miles, it might be of interest to the Army.

Immediately after the declaration of war upon Germany, Sperry began urging the Navy to embark on the development of an aerial torpedo. In this he was supported by the Naval Consulting Board which requested that SecNav apportion $50,000 to carry out experimental work with aerial torpedoes in the form of automatically controlled machines capable of carrying explosives. With this recommendation, the government included development of a flying bomb, or aerial torpedo, in its war preparations. Elmer Sperry later recalled, "It was settled in the [Senate] that the torpedo should be of two classes," one of which would be completely automatic and the other rigged for wireless control.

The details were settled by May 17 when Elmer and Lawrence Sperry met with the Secretary and other Navy officials. The Navy would furnish five N-9 seaplanes and purchase six sets of Sperry automatic control gear. Sperry would construct hangars, furnish testing grounds and secure a staff. Secretary Daniels approved spending $200,000 on this project, half to be administered by the Bureau of Ordnance and half by the Bureau of Construction and Repair and the Bureau of Engineering.

Once a course of action had been determined, the Sperrys went to work. As they got underway, seven large planes were turned over to them and a flying field at Copiague, Long Island, was obtained. A number of hangars were established there with a Marine guard for security. Aerial torpedoes were tried out in well over a hundred shots before the Armistice was signed November 11, 1918.

Obtaining a field, erecting hangars, obtaining aircraft and constructing the control gears took time. In the interim, Sperry proceeded upon the second phase, development of radio control gear. He employed a radio engineer to design some of the necessary apparatus. The fact that Western Electric was working on audion amplifiers and other radio devices led Sperry to believe that the solution to the "wireless end of the aerial torpedo" was in sight. Thus encouraged, he purchased rights to other radio inventions.

(To look ahead, these radio control systems were not tried out in the Navy's aerial torpedo. However, under the auspices of the Naval Consulting Board, the Sperrys applied radio control to a conventional bomb by which a parachute, or "black umbrella," was attached to the bomb and marked with a big aluminum arrow. Thus the aircraft crew could observe the trajectory of the falling bomb and send out corrections via radio. A receiver in the bomb set a mechanism in motion to adjust the trajectory. In tests, this mechanism was controlled from a distance of four miles.

(Later, in 1922, the Sperrys constructed "messenger" planes to A. V. Verville's design for the Army and fitted some of them with aerial torpedo gear and a radio control system developed by the Army Air Services engineering division. These craft "hit" targets at 30, 60 and 90 miles from the point of takeoff.)

To return to the 1917 flying bomb, aside from the development of radio, Sperry's initial work dealt with testing and perfecting mechanisms for maintaining course and measuring distance.

Test flights in which the pilot took the Navy-furnished N-9 off and then turned control over to the automatic gear commenced in mid-September. This gear, it was reported, would fly the plane to the designated target and drop a bag of sand on command from the distance gear. By mid-November, 30-mile test flights were being made regularly with an error in range of about two miles.

During this phase, Rear Admiral Ralph Earle, Chief of the Bureau of Ordnance, submitted his ideas on the best ways to win the war quickly. Most important was nullification of the submarine menace by destroying these vessels and their home bases. One of his suggestions was that vessels carrying flying bombs could take station off shore from the German submarine bases of Wilhelmshaven, Cuxhaven and Helgoland. The flying bombs, which were little more expensive than water torpedoes and could carry one-and-a-half times their explosive load, would then be launched. RAdm. Earle described these bombs as capable of destroying docks, submarines, destroyers, floating docks, gun factories and so on. (This suggestion contained an element of prophecy: In September 1944, a B-24 drone attacked the WW II submarine installations at Helgoland after an earlier attempt had resulted in the death of Lt. Joseph P. Kennedy, Jr., and Lt. Willford J. Willy when their explosive-laden plane exploded in mid-air before they could set the controls and parachute to the ground.)

Despite the Chief of BuOrd's recommendation and the early tests, the Chief of Naval Operations laid down this policy: While the flying bomb was to be developed to the point of complete readiness for production, no

facilities were to be obligated in order to manufacture it for the Navy. BuOrd therefore sought by some means to obtain airframes and engines in large quantity without interfering with scheduled aircraft production. In addition, the Navy invited Major General George O. Squier, Chief Signal Officer of the Army, to witness a demonstration of the flying bomb. Squier caused a somewhat parallel project to be set up by the Army at McCook Field, Dayton, Ohio, although with much greater emphasis upon producibility and low cost.

Development of the flying bomb involved solution of several serious problems. It was necessary to obtain a practicable airframe, find means of launching a pilotless vehicle and make sure that the control mechanism would operate effectively after a pilotless launch. Since these problems were interrelated, difficulties with the launching device obscured the aerodynamic inadequacies of the airframe, and both served to blur short-comings of the control mechanism.

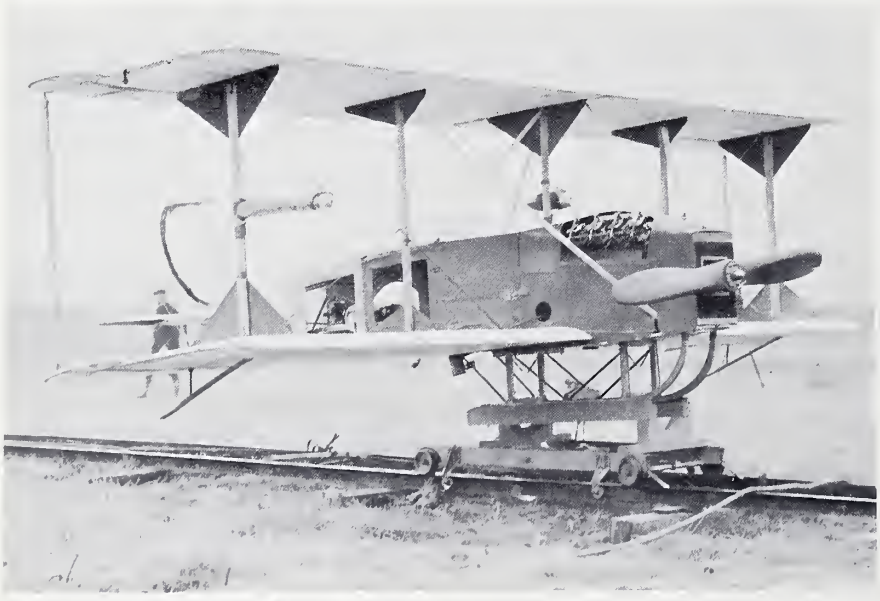
With regard to the airframe, little was done to obtain a more efficient machine until Sperry began demonstrations with the N-9 in September 1917. Then, in October, a rush order was sent to the Curtiss Aeroplane and Motor Company for six planes of special design with an empty weight of 500 pounds, a top speed of 90 miles per hour, a range of 50 miles and the capability of carrying an explosive load of 1,000 pounds. The engine was to be as light as possible and the plane was to be fitted for special control equipment.

The first of these planes (hereinafter identified as the Curtiss or the Curtiss-Sperry flying bomb) was delivered on November 10, just within the 30-day deadline specified in the contract. It had never been flown as a piloted craft nor checked in a wind tunnel. Even had the flying bomb been based upon a proven design, it would still have constituted a radical departure and required additional testing.

A couple of abortive attempts to launch the craft as a flying bomb led to the realization that some knowledge had be to obtained of the craft's flying characteristics. One of the planes was then fitted with a ski-type landing gear and taxied over the ice for the purpose of adjusting the ailerons and elevators. Lawrence Sperry, rashly deciding he would be the test pilot, had the plane fitted with a seat and standard stick control. While taxying for his first takeoff, the plane struck a bank of slushy snow, turned two somersaults and was completely wrecked. Sperry walked away unhurt. Undaunted he tried again and this time got plane #2 into the air. When he cut in his automatic controls, they wrested the plane away from him and turned it over laterally twice. Fortunately, he succeeded in righting it and in landing safely.

Clearly something more was required than flight test of the airplane. With true Yankee ingenuity, Lawrence Sperry and his assistant, N. W. Dalton, fitted a Marmon automobile with an airplane motor and attached to it a frame on which they could fasten the flying bomb. With this rig, they drove over the Long Island Motor Parkway at 80 miles per hour to make a kind of open-air wind tunnel test. Finally, they succeeded in getting what they considered to be satisfactory adjustments to the plane's control surfaces and automatic gear. This led to two launching attempts, one successful and one unsuccessful.

In August and September 1918, two tests of the Curtiss flying bomb were made; two flights of 100 yards were achieved before the planes crashed to the ground. Of these, only one was blamed upon the flimsy aircraft structure, but disgust was complete. The Curtiss flying bomb was abandoned in favor of a return to the N-9. In the meantime, the Sperrys had built a model for wind tunnel tests and these were eventually carried out at the Washington Navy Yard, but not until after cessation of work with the Curtiss flying bomb.



A CURTISS-SPERRY FLYING BOMB IS SHOWN HERE MOUNTED FOR A CATAPULT LAUNCH

The problem of launching a pilotless aircraft or flying bomb was as complex as that of determining the flight characteristics of the airframe. The initial Hewitt-Sperry concept—Wilkinson examined their aerial torpedo in September 1916—was that the device would be launched by catapult or from the surface of the water. In any event, when the Sperrys made the first pilotless tests of the flying bomb late in 1917, they launched it by sliding it down a wire cable. In this launch, a wing was damaged. On the second trial, the plane arose from the wire but immediately plunged to the ground.

These failures led to the abandonment of the wire-launching apparatus in favor of a more conventional catapult consisting of a 150-foot track. Power was obtained by dropping a three-ton weight from a height of 30 feet. Troubles continued. On the first attempt to use this device, the flying bomb lagged the car, damaged its propeller and then the plane turned over on its nose. A month later the catapult worked satisfactorily and the plane seemed to respond to its automatic controls, but proved to be tail-

heavy when it took to the air, stalled, side-slipped and fell to the ground.

These failures were followed by the already recounted hair-raising experiences when the flying bomb was put on sled runners. Then came the trials with the Marmon automobile. After the controls were satisfactorily adjusted, a launch was actually made from the car on March 6, 1918. The machine left the car cleanly and flew the thousand yards for which the distance gear had been set, descended and struck the water with only moderate damage. This was epoch-making in that for the first time in history an unmanned plane had made a smooth, stabilized flight in response to automatic control. The feat could not be duplicated on a second attempt, so a decision was made to use a smoother roadway.

The Marmon was fitted with railroad wheels and an idle spur of the Long Island Railroad, four miles east of Farmingdale, was brought into service. A run was made down the track but, before flying speed was obtained, the plane developed sufficient lift to raise the front railroad wheels of the car so that they came free and another crash resulted.

The deficiencies of these three methods of launching led the Sperrys to try a new type of catapult in which a heavy flywheel was spun at high speed. Through a clutch and drum arrangement, the flywheel imparted a constant acceleration to the car carrying the flying bomb. (To perform the detailed design work, the Sperry Company employed a young consulting engineer, Carl L. Norden.) This device was not completed until August when its first test ended in failure. Two more trials the next month were only partially successful. After this the N-9 returned to favor. Preparations were finally completed in mid-October and on the 17th a launch was made. The plane was catapulted cleanly. It climbed steadily, flying in a perfectly straight line at an angle of about two degrees to the proposed line of flight. The distance gear had been set for eight miles, but it failed to function, so the plane continued on course and was last seen over Bayshore air station heading east at a height of about 4,000 feet.

The third area of problems connected with the flying bomb was the stabilization system. In the various unsuccessful attempts to launch the craft, behavior of this gear could not be checked. It had misbehaved during Lawrence Sperry's piloted test flight. One of the purposes of the tests on the Marmon automobile had been to observe its functioning at flight speed. Satisfactory settings were made for the one successful flight. The acceleration imparted to the plane by the flywheel catapult would have caused the gyroscope to precess. To prevent this—at least for the last flight—the gyroscopes were not released until the launch was completed. At the same time, additional batteries were provided to insure adequate power for the gyroscopes.

In the last launch, on September 26, 1918, the flying bomb made a straight climbing flight of about 100 yards, spiraled and crashed. Either the stabilization system or the airframe was at fault and changes were made to both. The stabilization gear which had been used for all work with the flying bomb was abandoned in favor of the four-gyroscope unit tested earlier in the N-9. The single gyroscope system adapted from the underwater torpedo gear was retained for course, or azimuth, control in order to operate the vertical rudder. For the successful flight of the N-9 on October 17, this course and stabilization gear functioned satisfactorily. Even so, the Navy requested Carl Norden to examine the various Sperry devices and to recommend improvement.

The Navy continued to press its view on how to proceed and was actually contemplating purchase of new flying-bomb airplanes on its own, rather than through the Sperrys. The flight with the N-9 may have been an effort in part to restore Navy confidence; if so, it was to no avail. Sperry made various attempts to stir up additional enthusiasm by calling the flying bomb "the gun of the future" and an important step towards "making war so extremely hazardous and expensive no nation will dare go into it." Despite this, at war's end, the Navy took over from Sperry complete control of the flying bomb development.

During the early post-war years, the Navy sponsored similar projects. For the first of these, Witteman-Lewis aircraft and Norden-designed gyro-stabilizers were used. Demonstrations at Dahlgren were no more successful than those achieved by the Sperrys. In 1921, the project was again reoriented to emphasize the radio control aspect. The control gear was developed at the Radio Laboratory at NAS Anacostia (later the Naval Research Laboratory). Aircraft installations were made, beginning in 1923, and, despite relatively successful demonstrations of technical features, interest waned and the project lapsed in 1925. Over a decade was to pass before the Navy seriously undertook the development of target drones and military versions of pilotless aircraft.

AN AUTOMOBILE IS SUBSTITUTED FOR A WIND TUNNEL IN A TEST OF A FLYING BOMB

U.S. NAVY PILOTS IN ENGLAND POSED FOR JULY 1918 PICTURE IN WHICH UNIFORM VARIETY CLEARLY APPEARS

The Evolution of the Aviation Green Working Uniform

AT NAS LE CROISIC IN THE UNIFORM ADJUSTMENT DAYS

Until 1917, any "serviceable" uniform could be worn for Naval Aviation duty and, judging from photographs taken in early 1917-1918, they ran the gamut. Aviators were shown in khakis, blues, greens, leggings and puttees, and two and four-pocketed coats.

June 22, 1917, a summer service flying uniform for officers detailed for aviation duty and officers of the Naval Reserve Flying Corps was prescribed to be worn "when on immediate and active duty with aircraft." The uniform was khaki, designed in line with summer dress whites. Leggins of drab were worn with breeches and high, laced, tan leather shoes. The prescribed "working dress" uniform was a one-piece overall suit, capable of being worn over the summer service uniform. It was the same color, made of canvas, khaki or moleskin.

On September 7, 1917, a winter service flying uniform was prescribed. It was to be the same as the summer service in design, but forestry green cloth was substituted for khaki. At the same time, a Naval Aviator's device was adopted. In October, brown gloves and an overcoat were added as well.

In 1920, the first indication that the aviation green uniform was not here to stay appeared in a letter from the Bureau of Navigation that advised aviation officers that they could anticipate a possible discontinuance of the forestry green uniform.

A Bureau of Navigation circular letter, dated October 13, 1922, announced a new set of uniform regulations and detailed some of the changes that would be in effect: "Uniforms for aviation will be the same as for other naval officers, doing away with the green and khaki, which may be worn until June 1, 1923, but only at air stations."

The abolishment turned out to be temporary. Aviation uniforms, both khaki and green, of somewhat different design were reinstated April 8, 1925, and eventually influenced the design of the summer khaki today.

The Origin of Navy Wings

A Naval Aviator's device, a winged foul anchor with the letters 'U.S.,' is hereby adopted to be worn by qualified Naval Aviators. This device will be issued by the Bureau of Navigation to Officers and Men of the Navy and Marine Corps who qualify as Naval Aviators, and will be worn on the left breast." So stated Change 12 to Uniform Regulations approved by the Secretary of the Navy on September 7, 1917. A second change, approved Oct. 12, 1917, removed the letters "U.S." from the design and Navy Wings became a part of the uniform. The official act of adoption is clear; much of what led to it is not.

It appears likely that need for a distinguishing mark was voiced by the aviators themselves, particularly after Army aviators began wearing "badges" in 1913. But it also appears that outside influence provided some of the initial impetus. A letter, dated June 29, 1917, from the G. F. Hemsley Co., stating that the sender "takes the liberty" of forwarding a design for an aviation cap and collar ornament, may well have started official action. In forwarding it to the Bureau of Navigation, the Chief of Naval Operations rejected the ornament but went on to say that since foreign countries and the U.S. Army had adopted an aviation device, Naval Aviators also should be given "some form of mark or badge to indicate their qualification, in order that they have standing with other aviation services." The letter, which had been prepared in the Aviation Section and in which LCdr. John H. Towers had a hand, enclosed a design for wings as representative of what was wanted.

From this date the subject was kept very much alive by the exchange of correspondence with a number of firms interested in producing the wings. Bailey, Banks and Biddle of Philadelphia was one of them. By October that company seems to have taken the lead over its competitors and on the 24th submitted its first sample pin. In early November it submitted other samples and was ready to make "prompt delivery of such number of devices as you may desire."

The design passed through a number of changes. Bronze, the first metal proposed, was quickly rejected in favor of a gold and silver combination which in turn was changed to all silver and finally, in October, the decision was for all gold. Size changed from over three inches to the final of two and three-quarters. Stars on the shield were proposed and rejected as violating the laws of heraldry.

Lt. Henry Reuterdahl, later assigned as an artist to record the NC trans-Atlantic flight, played an important part in design development. In a letter of September 28th, he recommended simplifying the wings by bolder chasing and a reduction in the number of feathers, noting that "most naval ornaments are too fine and not broad enough in character." He also recommended changes in the anchor and rope and the introduction of a slight curve to conform to the shape of the body. He summarized his remarks by saying, "My idea has been to reduce all corners so that there will be no points which might catch in the clothing."

On the final decision to place an order, the record is obscure but it may have been a BuNav letter to the Supply Officer dated November 21, 1917, selecting "the higher priced pin" (the price was $1.15 each). The company was not named. That it was Bailey, Banks and Biddle, however, seems fairly certain. Its letter to BuNav dated December 19 confirms a telegram quoted in part as "balance aviator insignia shipped tomorrow."

CHANGES *through the years (from the top) show the original design, the 1920's model, the present wings and those worn by astronauts.*

That the first pins were delivered in this month is also confirmed in a December 26 letter from BuNav to Pensacola, reporting that the new pins had been received and "will be sent out as soon as they can be engraved to show the Aviator's number, his name and branch of service."

Engraving the aviator's number posed a problem, however, that was solved only by preparation of an aviators' precedence list, covering numbers 1 through 282, by the Aviation Section of CNO. Thus, wings were responsible for the first precedence list and, in addition, were a factor in the later assignment of fractional numbers to many aviators omitted from this first compilation. When forwarded to BuNav on January 19, 1918, distribution of the first wings could begin. It seems likely that Towers, as Senior Naval Aviator in Washington at the time, was an early, if not the earliest, recipient.

After almost eight years of Naval Aviation and nine months of war, Naval Aviators had Wings—a badge of qualification that would set them apart from all men.

THE WAR AGAINST THE U-BOAT

The United States Naval Air Force, Foreign Service, executed 30 attacks against enemy submarines, of which ten were considered to have been at least partially successful; it dropped 100 tons of high explosives on enemy objectives, and it had to its credit a total of 22,000 flights in the course of which it patrolled more than 800,000 nautical miles of submarine-infested areas. In point of fact, it did immeasurably more than this, for these figures are very far from being a just or fair method of appraising the value of aircraft in naval warfare. I say this because almost always the damage inflicted by aircraft, when operating against surface craft, was of a contributory and indirect nature—'the seaplane summoned destroyers to the scene of action and the submarine was destroyed' describes what is meant by 'indirect' in this sense. The destroyers almost always got the credit, whereas the aircraft, the indirect destructive agency, was really responsible for bringing about the action in which the submarine was destroyed."

So spake LCdr. W. Atlee Edwards, former aid for aviation on the staff of Admiral W. S. Sims, testifying before the Lampert Committee in 1925.

The primary role of Naval Aviation in WW I was antisubmarine warfare. The first recorded attack on an enemy submarine by a U.S. Naval Aviator was made by Ens. John F. McNamara on March 25, 1918, while serving at the Royal Navy Air Station, Portland, England. Although his attack was successful enough to warrant special commendations from the Secretary of the Navy and Adm. Sims, the later evaluation was "possibly damaged."

The first attack from a U.S. Naval Air Station was from Ile Tudy, France, which, perhaps because of its location, had more antisubmarine action than any of our overseas stations. Two coastal convoys passed through its sector daily, one bound north, the other south. Around Penmarch Point, the water was deep near shore, free of reefs and sand bars and ideally suited to submarine operations. A majority of the "allos" received at Ile Tudy were from this area.

The operating routine was described by the station historian. "The sector was marked off into 25-mile squares, subdivided into squares of five miles. By this means planes were able to report position every half hour and be quickly and accurately located. Communication was maintained with shore bases by radio and pigeons, and with vessels by message buoys, phosphorous buoys, Very pistols and the blinker system. . . .

"A section of two planes escorted each convoy. As the sector was too long to be covered entirely by two planes, it was necessary to send out another section to relieve the first, when the convoy was approximately halfway through the area. This necessitated using at least eight planes per day for convoy work alone. In addition, there was always a section known as the 'Alert' ready to take the air from daybreak to dark in response to any 'allos' received. When the convoy was picked up, the planes would first circle over it. Then while one plane would remain around the convoy the other would fly as far as 10 to 15 miles ahead, zigzagging broadly on both sides. This plane would return, again circle the convoy, repeating the same maneuver again and again. Before leaving a convoy, the planes circled a last time in its neighborhood. In this way the convoy was well protected from surprise."

On April 23, 1918, a convoy escort of two Donnet-Denhaut seaplanes, piloted by Ens. K. R. Smith and R. H. Harrell, QM1c, saw the first action. They joined the southbound convoy of about 20 ships, approximately six miles north of Penmarch Point. As the weather was very foggy, they first flew to the rear of the convoy to look for stragglers, then flew a wide circle toward the main body. Shortly after, they sighted a suspicious wake, apparently being made by a submarine moving at good speed, and went in to attack. Smith dropped two bombs, the first landing on the fore part of the wake and the second ten feet ahead. The explosions created a heavy disturbance in the water followed by many air bubbles and appeared so successful that Harrell did not drop his bombs. Instead, he marked the spot with a phosphorous buoy and circled. Smith then flew to a destroyer, USS *Stewart*, and dropped a message buoy. *Stewart* arrived in the target area, followed soon after by the French gunboat *Ardente*, and dropped three depth charges. The pilots circling overhead saw small pieces of wreckage, particles of sea growth and large quantities of oil coming to the surface, and shortly after returned to their base. The oil was still visible from the air as late as the sixth of May.

Ens. Smith and his observer, Chief O. E. Williams, were officially credited by the French naval authorities with a submarine, were cited in the Order of the Day and awarded Croix de Guerre with Palm.

The North Sea coast of England, where NAS Killingholme was located, was also a favorite sub-hunting ground. In the month before the station was under U.S. command, Ens. J. J. Schieffelin attacked a submarine which, possibly because of damage, surfaced after he left the scene and was sunk by gunfire from British destroyers. Ten days later he was again in action. While he was en route to the Whitby area, extremely rough air over Flamborough Head bounced his plane so hard that one of the suspending bomb hooks was bent and he was forced to jettison half his bomb load. Off Whitby, he sighted a surfaced submarine and attacked. His one bomb exploded under the stern of the submarine, kicking it clear of the water and exposing its rotating screw to view. The sub then disappeared under water at a steep angle. Later that day, after he had directed surface craft to the position, a submarine surfaced in the general area only to be rammed and sunk by the destroyer HMS *Garry*. There was initial confusion over whether this submarine was the one attacked by Schieffelin,

but later information confirmed that his submarine returned to base in damaged condition. The evaluation of both attacks was "probably seriously damaged."

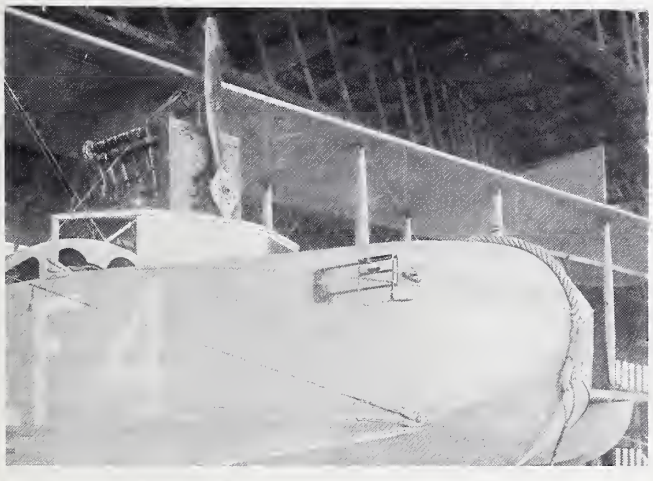
NAS Lough Foyle in northern Ireland, which guarded the north entrance to the Irish Sea, made its first attack October 19, 1918. Ens. George S. Montgomery, in seaplane LF-4, was escorting a 32-ship convoy when he sighted and successfully bombed a submarine apparently moving into position for an attack. Both bombs functioned, one striking 30 feet to the right of the periscope and the other ten feet forward. The assessment was "probably damaged" and the station history reported that "undoubtedly at least one ship in the convoy was saved by the timely bombing."

Submarines did not always react passively to these attacks. On at least one occasion against a seaplane and once against an airship, the U-boats fought back. On August 13, 1918, four seaplanes, one piloted by Ens. J. F. Carson, left NAS Dunkirk on patrol. A short distance off the coast, a large submarine was sighted proceeding on the surface at high speed. Since it carried no identification marks, Carson fired a challenging signal. At that point, the submarine apparently spotted the planes and opened fire with its four-inch gun. Five shots were fired, three passing close to Carson's plane, and several pieces of shrapnel pierced his fuselage and wings. Carson immediately returned fire with his machine guns and moved into bombing position. The submarine cleared the deck and dived. As she went down, Carson dropped two bombs, one exploding in the swirl and the second slightly forward of it. The submarine reappeared, her bow projecting from the water at a sharp angle. Within four minutes she again submerged, sliding stern first under water. Carson was credited with a sinking by the French government and awarded the Croix de Guerre.

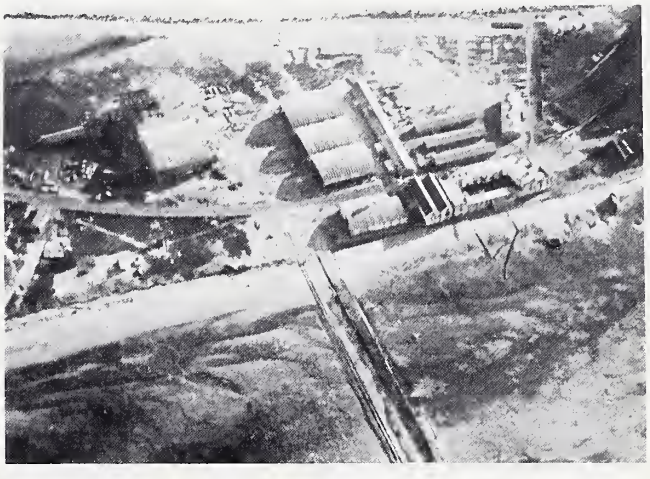
The airship involved was the AT-13 out of NAS Paimboeuf. On October 1, 1918, after escorting one convoy through the area, the airship turned to meet another. On the way, she fired two shots on a rock for target practice. On the second shot the firing spring broke, putting her only gun out of action and reducing her offensive capability to bombs. At about two-thirty, the convoy was picked up and the airship made the usual circle overhead. Then, as two storms were observed approaching from the north and northeast, the airship took a heading to pass between them. Shortly after, a suspicious object sighted to the north was investigated. While still a mile away, it was made out to be a submarine and when it opened fire there was no doubt that it was enemy. Thirteen shells burst near the airship but none struck her. The airship took up the chase to get into bombing position but the head wind was so strong that the submarine could not be overtaken. Signals by radio and Aldis lamp informed the convoy of the situation and the chase continued until the submarine disappeared in the darkness.

Action against the U-boat was not confined to overseas waters. On a Sunday morning, July 21, 1918, the U-156 surfaced off Nauset Beach, Cape Cod, and began what has since been called the Battle of Chatham. It was tersely reported in the weekly Aviation Bulletin as: "Sunday morning off Chatham, German submarine of the latest type appeared. She had two 6-inch guns with which she shelled and sank some barges. Seaplanes were sent out and submarine submerged." There was more to it. Details were reported by dispatch and telephone. The gist of it was that an enemy submarine was reported at 10:50, three miles off Coast Guard Station 50. Four minutes later, an HS-2, piloted by Ens. Eric Lingard, left the station, flew over the submarine at 400 feet and dropped a bomb which failed to explode. At 11:15, the C.O. of the station, Lt. Philip Eaton, USCG, took off in an R-9, reached the scene a few minutes later and bombed from 500 feet. The bomb hit about 100 feet off the starboard quarter. It too failed to explode. After firing four shots at the seaplanes, the sub submerged and was lost in thick smoke.

These are but a few of the 30 attacks reported by LCdr. Edwards. The evaluation of results was difficult, even as it was in a later war. The appearance of oil and sea growth on the surface after an attack was a common feature of reports in both wars. Then, as later, early assessments leaned toward the optimistic; post-war records gave the hard, cold facts. But more important than confirmed destruction was the extent to which Naval Aviators met the challenge of their first test in combat and presented a real threat to submarine commanders and kept them from their appointed tasks.

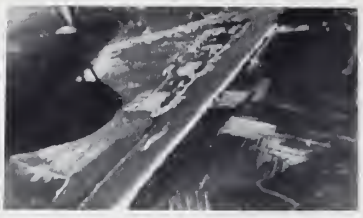


BOW SHOWS BOMB SIGHT DESIGNED AND BUILT AT LOUGH FOYLE.



STATION AT ILE TUDY SAW GREATEST NUMBER OF ASW MISSIONS.

A MEDAL OF HONOR EXPLOIT



NARROW CANAL AT PORTO CORSINI

IN THE ANNALS of Naval Aviation in World War I, no exploit for daring of execution and success in pulling it off is exceeded by that starring Naval Aviator #1494, Ens. Charles Hazeltine Hammann, USNRF. He and his fellow pilots were a unit of Naval Aviators who operated out of Porto Corsini in Italian planes.

This combination of American fliers and Italian aircraft had come about when the Italian government arranged for the U.S. Navy to take over and operate the air station at Porto Corsini, some 50 miles south of Venice. The take-over was accomplished July 24, 1918. Hoisting the flag, Lt. Willis B. Haviland, USNRF, put the new station in commission and air operations commenced. So successfully did the station carry out its mission that Admiral H. T. Mayo, USN, stated on the basis of his inspection November 10, 1918, that the station had "the distinction of being the most heavily engaged unit of the U.S. Naval Forces in Europe."

Lt. Haviland had come from Pauillac, France, in a special train which transported 331 men, certain officers and over 250 tons of supplies for the station. A detachment of officers and petty officer pilots arrived a little later from Lake Bolsena, 60 miles northeast of Rome, where they had been trained in the handling of Italian aircraft at the Naval Flying School. The school had been formally opened February 21, 1918, under the direction of Ens. W. B. Atwater. The courses, taught largely by Italians, included ground work and flying. Seventy-three men in all completed the curriculum. To back up maintenance, the Italian government had arranged for a special draft of mechanics selected from men training at the various Italian seaplane and motor factories.

That the Austrians were aware of the Americans' arrival at Porto Corsini was signaled by their carrying out a bombing attack, fortunately harmless, on the station on July 25th.

In accordance with the agreement with the Italian government, the U.S. forces were supplied with everything but food and clothing for the personnel. In the beginning, three planes were made available and the number of planes quickly increased, but there were never more than 21 altogether.

The planes the Navy used at Porto Corsini were Macchi types. Some of the bombing planes were M-8's, two-seater flying boats capable of carrying four 24-pound bombs and one machine gun. The M-5 Macchi fighters were one-seater flying boats, carrying two machine guns; two light bombs were occasionally added.

Porto Corsini was located in a strategic position in relation to Pola, the Austrian naval base which was, of course, the main objective of the U.S. Naval Aviators and their opposite numbers at the Italian Air Station in Venice. Since Venice was only about 50 miles north of Porto Corsini and 64 miles from Pola, air squadrons from both stations could rendezvous easily for a combined attack on the Austrian naval base. The battleships and cruisers of the High Sea Fleet were anchored at Pola and German and Austrian submarines went out from there in the Mediterranean campaign. The base and city were defended by 18 forts and batteries and there were no less than 114 antiaircraft guns in position. It was a formidable bastion.

Though Porto Corsini was in the right spot to launch an offensive, it had one tremendous disadvantage. All landings had to be made on a canal about 100 feet wide. This, combined with the necessity of taking off and landing directly into the wind, made for a real handicap since the prevailing wind was at right angles to the direction of the canal. This disadvantage was counteracted to some extent by training the pilots at Lake Bolsena to land on an area, marked off by buoys, which equaled the width of the Porto Corsini canal.

On August 21, the station at Porto Corsini carried out its first mission. In the middle of the morning, five fighters and two bombers set out with the purpose of dropping propaganda leaflets on Pola across the Adriatic. So popular had this mission become on the Italian Front at this time that the Austrians had announced that anyone caught engaged in this activity would

be regarded as a spy and summarily executed.

After the seven-plane group had been underway for about 15 minutes, one of the bombers and one of the fighters had to return on account of motor trouble. One bomber and the four fighters, the fighters flown by Ensigns George H. Ludlow, E. H. (Pete) Parker, Dudley A. Vorhees and Hammann, continued on, approaching Pola from the south in order to avoid fire from AA batteries at the harbor entrance. At 1120, the fighters arrived over the city at 12,000 feet, but the bomber was only able to get up to 8,000 feet. The leaflets were thrown down and the Austrians sent up AA fire. Five fighters of the *Albatross* type immediately took off, two seaplanes following them. The latter were soon lost to sight, but the enemy landplanes climbed rapidly and in five minutes neared the Navy's Macchi fighters. The enemy was coming in two sections, the first of which was made up of three planes.

ARTIST DEPICTS LUDLOW OUT OF COCKPIT ON WAY TO HAMMANN'S PLANE

Ens. Ludlow gave the signal to attack to protect the bombing plane. Followed by Parker, Voorhees and Hammann, Ludlow went into a dive toward the three Austrian planes and the dog fight was on at 8,000 feet.

Ludlow attacked the lead plane with a quick burst of fire, then swung over to engage the plane to his left. Parker then took on the leader who tried to escape by diving. Parker followed him down. His right gun jammed, so he pulled out, firing from his one good gun on another Austrian which swept into view, and broke out of the fight. Vorhees no sooner got into action than his guns jammed and he was forced to leave. The bomber also departed. This left Ludlow and Hammann to carry on the fight. While Hammann took on the two planes of the second section, Ludlow was in a fight with three. He drove one down smoking and in the next instant he himself was shot down. He took hits in his propeller and engine, oil streamed out and broke into flames. He went into a spin but managed to pull out of it and make a landing five miles off the harbor entrance.

Looking down, Hammann saw Ludlow's wrecked plane in the water and determined to try rescuing him, an exceedingly daring decision since the wind was blowing at the rate of about 20 miles per hour and the sea was choppy. To land his plane in such a sea was bad enough, but worse still was the fact that Hammann's flying boat was damaged and he might not be able to take off. Furthermore, he was near the harbor and enemy planes were still in the vicinity. It seemed unlikely in these circumstances that Hammann could rescue Ludlow and make a getaway, for the enemy might easily capture them and the fate of spies would be theirs—execution.

Undeterred by these considerations, Hammann spiraled down and drew up beside Ludlow's crippled plane. Thereupon Ludlow opened the port in the bottom of the hull, kicked holes in the wings to make the Macchi sink faster and jumped over to Hammann's plane. He climbed up behind the pilot's seat and sat under the motor holding the struts to keep from being swept into the propeller or off into the sea.

The tiny Macchi was built to carry but one man. How he was going to get into the air, Hammann had no idea. The bow of the plane, already damaged by machine gun fire, was smashed in as the craft gathered speed, but finally the little seaplane got off.

After becoming airborne, Hammann fired his remaining ammo into the wrecked plane and watched it sink; he was not going to leave the enemy that trophy. He began his 60-mile flight back to Porto Corsini, momentarily expecting to be attacked. For reasons never discovered, the Austrians made no attempt to follow the damaged plane, a pursuit they could have undertaken with no hazard to themselves.

At Porto Corsini, Hammann made a good landing in the canal, but the water poured through the bow and turned the Macchi over, a complete wreck. The fliers climbed out with the assistance of boats that had come to help them. Ludlow had suffered a bad gash on his forehead and Hammann was badly bruised, but both were fit for duty within a few days.

The Italian government awarded the Silver Medal of Valor to Ens. Hammann and a similar bronze medal to Ens. Ludlow. Ens. Ludlow also received the Navy Cross.

The President of the United States presented Hammann the Medal of Honor, the first awarded a U.S. Naval Aviator. He was cited for heroism in landing on the water alongside Ludlow's disabled airplane. "Although his machine was not designed for the double load to which it was subjected and although there was danger of attack by Austrian planes, he made his way to Porto Corsini."

It is one of life's bitter ironies that less than a year later, on June 24, 1919, Ens. Hammann met his death in a Macchi plane of the same type he had used in his exploit over Pola.

JULY, AUGUST, SEPTEMBER, 1918

The growth and expansion of Naval Aviation was in full stride. More stations were placed in commission and, as patrols were extended and intensified, U-boat commanders found the going progressively more difficult. Marine air units reached France; the Northern Bombing Group offensive began. The 1,000th Naval Aviator won his wings and many others neared that goal while training continued to expand. Although still too early to predict when the war would end, there was no doubt about the winning, and there was much to show that the end nearly was in sight.

NAS ST. TROJAN NEAR GIRONDE RIVER IN FRANCE

JULY

1—NAS Lough Foyle, Ireland, was commissioned to provide seaplane patrol over the North Channel entrance to the Irish Sea. Commander H. D. Cooke, in command at commissioning, was relieved by Lt. Carl T. Hull later.

1—Ground school classes began at the University of Washington, Seattle, in a program similar to that established one year earlier at MIT.

4—NAS Whiddy Island, located on Bantry Bay, Ireland, was placed in commission. Westernmost of our seaplane stations, its planes met Atlantic convoys as they approached the British Isles.

5—Seaplanes piloted by Ens. Harold J. Rowen and QM1C C. J. Boylan left NAS Ile Tudy in answer to an "allo" off Point L'Ervilly. Both attacked what was assumed to be a submarine, but there was no evidence of damage.

7—The Naval Aircraft Factory completed its first contract for 50 H-16 flying boats.

9—Ens. J. J. Schieffelin, on a flight out of Killingholme, attacked a U-boat which surfaced after he left the scene and was sunk by gunfire from British destroyers.

14—NAS St. Trojan, France, near the mouth of the Gironde River, was commissioned, Lt. V. C. Griffin commanding.

15—The first F5L completed at the Naval Aircraft Factory made its maiden flight with FltCdr. MacGill, pilot, and LCol. Porte, Maj. Partridge and Maj. Wadsworth on board. It was an all-British crew except for Wadsworth who was a U.S. Army major on duty at the factory.

19—Pilots of two planes on patrol out of NAS Montauk sighted the USS *San Diego* after she had struck a mine off Fire Island and sent the first reports of her sinking.

19—Ens. J. J. Schieffelin, on a flight out of Killingholme, sighted a surfaced submarine off Whitby and attacked. His bomb kicked the stern clear of the water and the sub disappeared at a steep angle. The assessment, as on his earlier attack, was "probably seriously damaged."

20—The RAF station, Killingholme, England, from which U.S. pilots had been flying since February, was turned over to American forces and placed in commission as a naval air station. LCdr. Kenneth Whiting in command.

21—A surfaced U-boat, firing on a tugboat and three barges in full view of bathers on Nauset Beach, Cape Cod, was attacked by two seaplanes from NAS Chatham which dropped bombs that failed to explode. After firing on both aircraft, the submarine submerged and escaped.

23—The RAF facility at Eastleigh, England, was commissioned as an NAS for use as a supply, assembly and repair station supporting the Northern Bombing Group.

24—NAS Porto Corsini, Italy, was placed in commission with Lt. Willis B. Haviland in command.

25—The Secretary of War approved a recommendation of the Joint Army and Navy Airship Board, thus completing an inter-service agreement assigning responsibility for the development of rigid airships to the Navy.

27—The N-1, first experimental aircraft built at the Naval Aircraft Factory, made its first test of the Davis recoilless gun for which it had been designed. Lt. Victor Vernon piloted and Lt. Sheppard operated the gun which gave "a very satisfactory performance" against a target moored in the Delaware River near the factory.

30—Headquarters Company and Squadrons A, B, and C of the First Marine Aviation Force, arrived at Brest, France, on board the USS *DeKalb*. Upon disembarking, the squadrons were redesignated 7, 8, and 9 respectively, and the force proceeded to airdromes between Calais and Dunkirk for operations as the Day Wing, Northern Bombing Group.

31—A naval air detachment was established at Dunwoody Institute, Minneapolis, to conduct a ground school similar to those at MIT and the University of Washington.

AUGUST

5—A flying boat, piloted by Ens. A. W. Hawkins with Ltjg. G. F. Lawrence as second pilot, took off from NAS Killingholme in rain and poor visibility at 10:30 p.m. to patrol a course intercepting a reported Zeppelin raid. The patrol was made above the clouds without sighting the enemy and came down through heavy weather at South Shields, England, at 5:30 a.m., almost out of fuel. It was the first U.S. night patrol out of Killingholme and may have been the first of the war by a U.S. Naval Aviator.

11—Ens. J. B. Taylor made the initial flight in the Loening M-2 *Kitten* landplane at Mineola, L.I. It was the

first monoplane developed under Navy contract, one of the smallest planes ever built for the Navy (empty weight under 300 pounds) and, although initially equipped with a British ABC motor, was designed for the Lawrance 2-cylinder, 30-hp engine that was the forerunner of the American air-cooled radial engine.

13—Ens. Frank E. Wade was designated Naval Aviator No. 1,000 at NAS Pensacola. Because of fractional numbers assigned to many who preceeded him, however, he was not the 1,000th Naval Aviator.

13—Ens. Julian F. Carson on patrol out of Dunkirk, sighted a surfaced submarine which when challenged opened fire with its deck gun. Carson's plane was hit by shrapnel in several places, but he returned fire and moved into bombing position. His bombs hit as the submarine was submerging, forcing it to the surface at a sharp angle. It stayed there briefly, then slid stern first underwater. Carson was credited with a sinking by the French government and awarded the Croix de Guerre.

15—Independent offensive operations of the Northern Bombing Group began as Ens. Leslie R. Taber of Air Squadron One piloted a Caproni bomber on a night raid on the submarine repair docks at Ostend. On the flight, Ens. Charles Fahy was copilot; D. C. Hale rear gunner.

17—While on a tour of overseas facilities, Assistant SecNav Franklin D. Roosevelt visited NAS Paimboeuf and was taken up as a passenger in the AT-1 blimp.

19—Naval Air Station Halifax, Nova Scotia, was placed in commission, Lt. Richard E. Byrd commanding.

19—In trial runs observed by Naval Constructors H. C. Richardson and C. N. Liqued, the Kirkham 18-T experimental triplane fighter, built by the Curtiss Company, achieved speeds of over 160 mph on a measured course.

21—A flight of bombers and fighters from NAS Porto Corsini was intercepted by a superior force of Austrian planes over the naval base at Pola. During the fight, Ens. George H. Ludlow was hit and forced down off the harbor entrance. Ens. Charles H. Hammann, whose fighter was also damaged, evaded his pursuers, landed alongside the downed pilot, took him aboard, and flew back to base. For his extraordinary heroism, Hammann was awarded the Medal of Honor—the first Naval Aviator to be so honored.

27—After having been in operation for almost a year, the NAS Hampton Roads was placed in commission with LCdr. P.N.L. Bellinger in command.

27—The Secretary of the Navy signed General Order No. 418 directing that "Applicable alike to regulars and reservists, the uniform of any given rank or rating in the Navy shall hereafter be identical in every respect throughout except for the necessary distinguishing corps devices and every officer of the Navy shall be designated and addressed by the title of his rank without discrimination whatever."

31—NAS North Sydney, a seaplane station on Cape Breton Island, Nova Scotia, was commissioned with Lt. Robert Donahue, USCG, in command.

In August, the Navy Department moved from the State, War, and Navy Building to quarters in a temporary structure on Constitution Avenue, now known as "Main Navy."

SEPTEMBER

1—The Commander U.S. Naval Aviation Forces, Foreign Service, assumed duty as Aid for Aviation to Admiral Sims, and new commands were set up for France, England, Ireland, Italy, and the Northern Bombing Group to control and direct operations in their respective areas.

3—An inspection and test department was established at NAS Pauillac, France, under command of Lt. C. P. Mason.

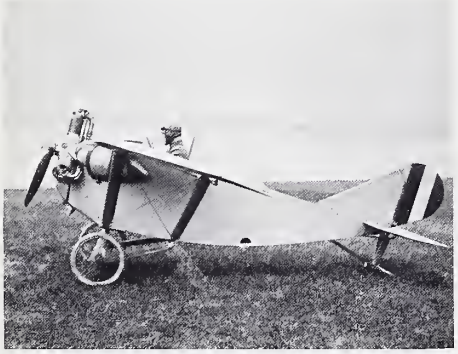
3—The first F5L assigned to service was delivered to NAS Hampton Roads. This twin-engine flying boat, built from a British design by the Naval Aircraft Factory and other manufacturers, was produced too late for use in the war, but saw extensive service in post-war years.

24—Ltjg. David S. Ingalls, while on a test flight in a Sopwith *Camel*, sighted an enemy two-seat *Rumpler* over Nieuport. He attacked and scored his fifth aerial victory in six weeks to become the Navy's first Ace.

25—Chief Machinist Mate Francis E. Ormsbee went to the rescue of two men in a plane which had crashed in Pensacola Bay, pulled out the gunner, and held him above water until help arrived, then made repeated dives into the wreckage in an unsuccessful attempt to rescue the pilot. For his heroism, Ormsbee received the Medal of Honor.

27—Ens. Edwin S. Pou and QM2C F. H. Tittle, piloting two seaplanes from NAS Ile Tudy on convoy patrol near Point Penmarch, sighted a possible submarine and dropped bombs which set off violent underwater turbulence. The assessment was "probably damaged."

28—Lt. Everett Brewer and Sgt. Harry Wershiner, flying with RAF Squadron 218, shot down a Fokker, scoring the first Marine Corps victory in aerial combat.



DAVIS GUN *(left), here mounted on the N-1, fired a charge of birdshot or sand rearward to compensate for the projectile and eliminate recoil. Lewis machine gun zeroed in on target. Pilot of the Loening Kitten (center) is not a giant; the plane is a midget. Kirkham 18-T, a two-seat experimental fighter (right) adaptable to sea or land and built by the Curtiss Company, made better than 160 mph on tests.*

Navy's First Ace

By Izetta Winter Robb

The Allied aviators who fought the battle in the skies during World War I were "the younger set" of their day. As that war neared its end, a French infantry colonel on meeting Georges Guynemer, the French ace, asked, "How old are you?"

"Twenty," was the reply.

"And the gunner?"

"Twenty-two."

"The deuce! There are only children left to do the fighting."

Even younger than these two was Lt. David Sinton Ingalls, USNRF, for at 19 he made the record that secures his name in the annals of history as the only U.S. Navy ace in WW I. And where it took Guynemer six months to become an ace, Ingalls required a day less than six weeks. As Naval Aviator #85, he chalked up his record while flying with the RAF in a British plane, the Sopwith *Camel*. From August 13 through September 24, 1918, he succeeded, alone and in cooperation with others, in downing at least four enemy aircraft and causing one balloon or more to burst into flames.

Exploits such as Lt. Ingalls carried out in those early days of aviation recall the words of Euripides, "Danger gleams like sunshine to a brave man's eyes." The accounts he wrote reveal a taste for daring and a skill to match.

Lt. Ingalls went overseas in September 1917 where he was assigned to various aviation training units in Britain. During two weeks in July 1918, he flew with RAF Squadron 213 "for experience," going on bombing flights to Ostend, Zeebrugge, and Bruges, but he had no encounters with the enemy.

Just as he was beginning to feel a part of the RAF, he was ordered to France to tussle with flying field construction for the U.S. Navy's Northern Bombing Group. Unhappy at this turn of events, he succeeded August 9 in wangling permission to rejoin Squadron 213 which was stationed in Flanders and making regular raids on German installations. Two days later, Ingalls opened up on the enemy in a way that was to bring him renown.

On August 11, Ingalls and an RAF officer in Sopwith *Camels* at an altitude of 14,000 feet, not far from Dixmude, sighted an enemy Albatros, a two-seater aircraft, as it came in at 10,000 feet toward the Allied lines. The Albatros apparently sighted the *Camels* at the same time, for he turned and dived toward Ostend. The *Camels* attacked, and the leader, firing about 150 rounds in short bursts at 150 yards range, followed the enemy down to 5,000 feet. Just as the *Camels* broke off combat, the Albatros plane went into a slow spin, and the two pilots saw it head for the ground, out of control.

Venturesome and eager for battle, Lt. Ingalls lost no time in scoring another, though different, success, for two days later, on the night of August 13, he flew over the German airdrome at Varsenaere. This was a low-level attack with a vengeance, for he flew so low his *Camel* nearly touched the ground. From this vantage point, he sprayed 450 rounds of machine gun fire into the facility while the surprised Teutons made desperate efforts to get him with their "Archies" (anti-aircraft guns). But undeterred, Ingalls swung in a wide circle and again headed for the hangars, letting loose four bombs and "putting out searchlights, scattering Germans, and mussing things up generally."

LT. DAVID S. INGALLS, USNRF

Such a maneuver deserved an encore. Thus it was on September 15 that Ingalls repeated at the German airdrome at Uytkerke the same tactic he had used at Varsenaere. He made a low-level attack out of the clouds upon the German hangars and fired 400 rounds from his Lewis machine gun into the canvas structures. Then, as he swung up, he cut free four bombs upon the Fokkers parked on the field below.

On the return flight, Ingalls sighted an enemy two-seater Rumpler west of Ostend at 6,000 feet. With Lt. H. C. Smith, RAF, also flying a *Camel*, Ingalls went after the two-seater. The enemy turned and dived toward Ostend, but that did not save him, for Ingalls and Smith followed him down, firing 400 rounds at close range which sent the enemy crashing in flames just off the beach.

Getting back to his base was always exciting and usually hazardous. On one occasion, Lt. Ingalls described for his parents the flight back: "I turned and dove down to the ground . . . for when way over the lines and not high enough to be safe from Archie, the stunt is to race along just over the ground at about 200 to 300 feet. . . . The only danger in this low flying is from the machine guns. The Huns had these scattered all over their country to get aeroplanes in similar predicaments. I knew fairly well where they were thickest and went along for at least five minutes without a shot. Then suddenly I heard a rat-tat, my motor [faltered], gas poured out of the tank below the seat, and clouds of white vapor rose from it. . . .

"Evidently I had run into a bad place, for I was shot at till I crossed the lines. Usually one turns, zooms, etc., when in this predicament, but I expected the . . . controls to go any second and even with what I had, I could not do any trick flying, so I sat still and by using the rudder kept going as fast as possible in little turns toward home. It was a big relief to get out of [range] across the lines. Then I had to land. . . . I came in slowly over the trees on the side and, using the

motor, managed to land.

"The machine was well shot up. One burst of several bullets had perforated the tank under my seat, and all but one strand of wires that cause one to go up were severed, as well as a number of strands in those to go down. One aileron had been hit at the hinge and, of course, there were a few holes in the wings. Hobson [his fellow pilot on this mission] had returned. He said that he had been back of and above me and had fired a lot from there and had seen the Hun burst into flames and crash, so we felt fine, and I got a new machine next day."

On September 18, Lt. Ingalls and two RAF officers, all three flying *Camels*, sighted a kite balloon at 3,500 feet in the La Barriere area. Crossing the coast, the *Camels* attacked, each of them firing about 90 Buckingham tracers. They followed the kite balloon down to about 900 feet and saw two observers jump with white parachutes just before the balloon burst into flames.

Describing this, Lt. Ingalls wrote, "Looking back, I saw a blaze flare up in the bag and then it crumpled in a great mass of flames and dropped directly on the three balloon sheds which promptly caught fire. It was a lovely sight."

In this sortie, all the *Camels* were struck by antiaircraft and machine gun fire but returned home safely.

Ingalls did not have to wait long for his next big attack. On September 20, while on escort for a bombing squadron heading for Bruges, the formation sighted four enemy planes heading toward the de Havilland bombers at about 15,500 feet. The *Camels* immediately attacked. Lt. Ingalls' particular quarry was one of the Fokkers which was pursuing a DH 9. Ingalls fired 100 rounds at 100-yard range. That did it. The Fokker, diving vertically and leaving a white smoke trail, was last seen out of control, very low, near Bruges, still descending.

Ingalls then attacked another Fokker, this one at a 25-yard range, and the latter turned on its back, spinning as it dived. Whether it was knocked out is uncertain; it is believed to have flattened out very low down. The remaining enemy planes spun away.

On September 22, Ingalls and four other *Camel* pilots flew all over Flanders, seeking out German hangars and ammunition trains as their preferred targets. On this round, Ingalls dropped four bombs on a German ammunition dump at Handezeame and blew up a number of wagons loaded with shells.

Later he landed four bombs on a large hut filled with explosives at Wercken. His next target was the railway station at Thourot where the Germans had an enormous supply dump. Ingalls scored two direct hits. On the way back after the fourth sortie for the day, he dropped four more bombs on a horse transport and, with his fellow pilots, got in enough bursts of machine gun fire to account for some 25 Germans and 45 horses.

But there was more to come. On a test flight September 24, Lt. Ingalls sighted an enemy Rumpler over Nieuport. Both Ingalls and the officer he was flying with attacked, each firing 200 rounds at 100 yards. They followed the enemy down to 600 feet and the Rumpler fell in flames.

The British Air Ministry honored Lt. Ingalls' gallantry with the Distinguished Flying Cross and ended his citation with these words:

"His keenness, courage and utter disregard of danger are exceptional and are an example to all. He is one of the finest men [No. 213] Squadron ever had."

And from his own service, the United States Navy, he received the Distinguished Service Medal:

"For exceptionally meritorious service in a duty of great responsibility as a chase pilot operating with RAF Squadron 213, while attached to the Northern Bombing Group, Northern France, where, as a result of his brilliant and courageous work he was made an Acting Flight Commander by the British authorities over their own pilots."

Lt. Ingalls' career in Naval Aviation did not end with World War I. During President Herbert Hoover's administration, he served as Assistant Secretary of Navy for Air, and under his leadership, great strides were made in research and development. He returned to active duty in WW II, serving first as a commander, then as a captain. Of the medals in that conflict, he holds the Legion of Merit and Bronze Star. He was in the thick of Navy's war in the Pacific, retiring as a rear admiral in the United States Naval Reserve.

FIRST NAVY ACE BECAME ASSISTANT SECRETARY OF NAVY (AIR)

A SOPWITH 'CAMEL' OF THE TYPE LT. INGALLS FLEW IN WORLD WAR I

The Northern Bombing Group

The most ambitious operational project undertaken by Naval Aviation during World War I had as its objective the destruction of the submarine bases at Ostend, Zeebrugge, and Bruges by aerial bombing. These bases along the Belgian coast were to be subjected to continuous day and night bombing by Marine and Navy squadrons, collectively known as the Northern Bombing Group, based in the Calais-Dunkirk area. Had plane deliveries matched the readiness of the shore establishment and the assignment of trained personnel, the results might have been substantial. As it was, the operations of the Group were delayed and Allied successes on the ground brought the war to an end before the air offensive really began.

There are many interesting aspects in the background of the Northern Bombing Group which cannot be told here for lack of space. Conception of the idea or plan of operations, for example, has been attributed to different men by different writers, but it was actually the outgrowth of many individual and collective proposals that began in June 1917 when Lt. Kenneth Whiting selected Dunkirk as the site for an American air base. The heated controversy over service roles and missions created by the Navy's intention to use landplane bombers (this was ultimately resolved, the planes were procured with the complete cooperation of the Army) is also an area which has had only partial, and somewhat subjective, coverage. The delivery of Capronis from Italy, no small task for men without previous experience in that type of flying, is another untold story. But all these interesting accounts must be left for later writing, and it is the hope of *Naval Aviation News* that these may be included in some future issue.

Here, in the interest of presenting an authoritative account of a unit unique in the annals of Naval Aviation history, we present extracts from a report of the Northern Bombing Group made by its commanding officer, Captain David C. Hanrahan, USN, on December 3, 1918. We have added a few details from an unidentified history filed with the basic report in the National Archives.

The Northern Bombing Group was originally planned to operate as one day wing and one night wing consisting of six squadrons each, and one assembly, repair and supply unit, to be known as Base B, located in the vicinity of these wings. The whole was to be under a group commander, each wing under a wing commander, and each squadron under a squadron commander. Squadrons of the day wing were subdivided into three flights, of six planes each, under flight commanders, while those of the night wing were subdivided into two flights of five planes each, also under flight commanders. By order of the Navy Department, cablegram 2416 of May 31, 1918, this force was reduced to four day and four night squadrons for the time being, owing to the inability to obtain sufficient planes.

A further cable, in June, stated that it was thought inadvisable to establish a large supply base in northern France, because of the military situation at the time, and that sites should be investigated for this base in England. In view of this, an investigation was instituted to secure a site in southern England. The Air Ministry took the matter under advisement. The first week in July we were informed that the airplane acceptance park at Eastleigh, about four miles north of Southampton, could be turned over if it met with our requirements. On July 4, 1918, this was inspected by me and experts in the departments concerned, and the reports being satisfactory, it was decided to accept the British offer.

Construction was already in progress. Hangars were about 90 percent complete, storehouses about 30 percent complete, and living quarters for about 300 persons completed. The flying field was ready, roads were practically complete, and a light gauge railroad was running through the park.

We were informed that the Eastleigh station could be taken over on July 20. On that date, Lt. G. deC. Chevalier was appointed temporary commanding officer. He immediately took command, and a detail was sent to occupy it. Arrangements were begun to transfer all supplies of the Group from Pauillac and to divert all supplies en route from the United States to this station.

Owing to the location of Base B across the Channel, arrangements were made whereby the Royal Air Force depot, situated at Guines, France, could be used as a park for all minor repairs to planes and engines, and it became necessary to locate a supply base in the field to cart consumable supplies up to two month's requirement. It was also necessary to establish for purposes of transport a motor park in the field.

The following fields had originally been selected for the squadrons: St. Inglevert, Campagne, Spyker, Le Frene and Alembon. Because of the reduction in squadrons, rearrangement of the squadrons on the fields became necessary as follows: Night Squadrons 1 and 2 to Field A at St. Inglevert, Squadrons 3 and 4 to Field B at Campagne, and Field C at Sangatte became a dummy aerodrome. Day Squadrons 7 and 8 were assigned to Field D at Oye: Squadrons 9 and 10 to Field E at Le Frene, and a dummy and reserve aerodrome was set up at Field F at Alembon. Because the military governor of Calais objected to the proximity of the aerodrome at Sangatte to that city, this field was derequisitioned early in August. The Alembon facility was also used as a bomb dump.

The headquarters for the Group was at Antingues, a few miles south of Ardres. At these headquarters were also established the field supply depot and motor transport park. A site at Bois-en-Ardres was selected as day wing headquarters. Night wing headquarters were temporarily located at the chateau at St. Inglevert which was, in addition, squadron headquarters.

For night squadrons, the 600-hp Caproni biplane, equipped with three Fiat motors, was selected. These planes were manufactured at Milan, Italy, by the Caproni Company and were flown from the acceptance park there to the fields of the Group. The route decided on was from Milan to Turin, Italy, to Lyon, France, to Dijon, to Paris, and from there to Field A.

The agreement entered into with the Italian authorities provided that the material required for building these planes would be replaced by material sent directly from the United States to Italy. All planes completed were to be delivered to the U.S. Army representative and a certain allocation of the monthly production to be designated by him for U.S. Naval Aviation. The agreement called for delivery of 30 Caproni planes during June and July 1918, and 80 during August. The actual number delivered to us was nine during July and nine during August. The failure to deliver the number agreed upon was due entirely to the incorrect estimate of the firm's output.

As these planes were allocated after acceptance, they were further tested and then flown north by pilots who had been schooled in Caproni planes in Italy. During the latter part of July and the first part of August, a great deal of weather unfavorable for flying was experienced. This caused considerable delay in ferrying these machines to the aerodrome.

It was found that these planes required considerable change to prepare them for active service over the lines. Base B not being sufficiently advanced to undertake this work, owing to the non-arrival of machines, tools, etc., the squadron was thus required to do acceptance work for which it was not organized nor fitted.

On the arrival of the first Caproni, it was immediately prepared for war flight by rigging of bomb gear, rearrangement of landing gear wires, rigging of required navigational lights, installation of additional instruments, and equipment of guns. The first plane was flown on an active war flight on the night of August 15; objective the Ostend docks.

It was found, as additional planes arrived at our aerodrome, that the Fiat engines were giving considerable trouble. Test after test, made in the hope of eradicating the cause of engine failures, proved unsatisfactory. To operate successfully over the region, engines would be required to run for a period of at least four hours. In no case was a successful running test of four hours with the Fiat engine achieved, after the first flight on August 15.

Examination of the engines showed poor workmanship and poor construction in practically all engines, which necessitated their being completely taken down and rebuilt. After a long series of tests and overhaul this was finally decided upon, and these planes were taken out of active operation until the satisfactory four-hour test in the air could be accomplished.

Owing to the troubles experienced with this motor, inquiries were made as to the possibility of procuring a substitute. It was found that the Isotta-Fraschini motor could be secured in small numbers, and tests having proved them to be considerably superior to the Fiat, arrangements were made with the Italian government to equip future deliveries of Capronis with these motors and to box the planes for rail transportation. The same action was taken by the U.S. Army. The first Caproni fitted with Isotta-Fraschini motors arrived at Eastleigh about November 8, too late to be assembled before the cessation of hostilities.

During the latter part of August, because of the unsatisfactory performance of the Capronis, attempts were made to procure Handley-Page machines for the night squadrons as personnel were on the field ready for operations. By an arrangement with the U.S. Army and British authorities, an agreement was effected by which *Liberty* engines were exchanged for 20 Handley-Page planes to be equipped

MARINE DH-4'S OF DAY WING, NORTHERN BOMBING GROUP, AT PAUILLAC, FRANCE

CAPRONI 450: *The type in which Navy pilots, destined to operate with the night wing, received their training in multi-engine landplanes at Malpensa, Italy (Pete Bowers' photo).*

with *Liberty* engines; ten to be delivered to this Group, the Army taking the other ten. The first of these Handley-Page planes were being tested at the time hostilities ceased.

During this period, owing to the fact that the pilots and ground personnel were inactive, opportunity was taken to allow them to operate with active British squadrons over the lines, this to continue up to a time when their services would be required for operating our own planes. In this way, creditable results were achieved in spite of the lack of planes for this group.

For day squadrons, the DH-4 with *Liberty* motor, as manufactured in the United States, was selected. These planes were obtained from the U.S. Army and were packed and shipped to France. Four of these planes were assembled at Pauillac and from there flown to the field. As future shipments arrived, they were transferred to Eastleigh, but due to non-delivery of DH-4's from the States, by the middle of August, the Commander, U.S. Naval Aviation Forces, Foreign Service, obtained by concession of the British Government, in exchange for *Liberty* motors, 54 DH-9a planes. As these were delivered to Base B at Eastleigh they were assembled and flown to the field. The first DH-4 arrived from Pauillac on September 7, 1918. The first DH-4 arrived from Base B on October 2, 1918.

Considerable delay in the assembly of the American DH-4 planes was caused by the fact that the technical committee, composed of American and British officers, who inspected the planes on arrival, reported that a number of alterations should be made before these planes were safe for flying. These alterations necessitated the use of considerable extra material, and further delay was experienced in obtaining it as it was a priority type. In spite of this and the late arrival of machinery and equipment for Base B, the alterations were made as the planes arrived. The machines were then flown to the field and put into active operation.

The majority of construction material for the building of camps, roads, etc., plus tents, provisions, and a number of portable and accessory buildings, were obtained from the British depots in northern France by permission of the Air Ministry. This placed us on practically the same footing, in this respect, as other British squadrons in this district, and we continued so up to the date of demobilization. This allowed the Group to start operations at a much earlier period than would have been possible had we had to wait the arrival of shipments from the United States.

Shipments of stores, material, etc., to the field from Pauillac were accomplished by the use of steamers, docking at Calais, by military train, and motor transport. A small amount of motor transport was obtained from the French stations, but it was entirely inadequate for our use. The lack of motor transport considerably handicapped us in the rapid transportation of material and supplies after arrival by water or rail. Motor transports ordered in the United States for this Group did not commence to come into French ports until August 1 when the USS *Pensacola* arrived at Pauillac.

Squadron 1 of the night wing was organized about the middle of June 1918, and a number of men were dispatched to the field on June 20 under the command of Lt. C. R. Johnson, relieved in August by Lt. Robert A. Lovett, who also commanded the night wing. The first week in August three Marine squadrons of the day wing, commanded by Maj. A. A. Cunningham, arrived from the United States and were dispatched to the field. (The fourth Marine squadron arrived in the field October 6.) By August there were sufficient officer personnel to staff group headquarters, and its organization was about complete on September 1.

Personnel on board upon the signing of the Armistice, November 11, 1918, approached authorized allowances: 130 officers in group headquarters in the night wing and 164 officers in the day wing, including 88 and 80 pilots in the respective wings. Enlisted men totalled 1,336 in the night wing and 818 in the day wing. Aircraft on hand on the same date were: 6 Capronis (2 in commission), 12 DH-4's (8 in commission), and 17 DH-9's (7 in commission), considerably under the planned 40 Capronis and 72 DH-4's.

Two types of training were designed to equip flying personnel for active work against the enemy: (1) primary training in flying, aerial gunnery, formation flying, and bombing at aviation schools, and (2) final training with active service squadrons at the front. Advantage was taken of the aviation schools in England, France, and Italy to accomplish this training, and pilots were therefore detailed to Italy for training on Caproni night planes, to Clermont-Ferrand for day bombing planes, to Moutchic for preliminary training and to Stonehenge, England, for day and night bombing. Final training was accomplished by placing pilots, observers, and ground personnel in active British squadrons at the front, operating in the same area in which the Northern Bombing Group contemplated operations.

Since the early part of June 1918, U.S. naval personnel of the night wing have been attached to Number 214 Squadron, 5th Group, RAF, for training and for actual war service. Six pilots were originally transferred, and after this squadron was bombed out of Coudekerque and shifted to our aerodrome at St. Inglevert, additional personnel were accepted. Since the

personnel under training with Number 214 Squadron was constantly changing and gradually increasing, by August 10 there were attached for training and service seven pilots and about 40 enlisted men. During October, two of the Handley-Page machines, attached to 214 Squadron and manned almost entirely by personnel from our night wing, participated in night bombing raids under the direction of the squadron commander.

On August 11, 1918, the first Caproni arrived in the field. On August 15, this plane, piloted by Ens. Leslie R. Taber, with Ens. Charles Fahy as copilot and D.C. Hale as gunlayer, made a successful night raid on the submarine shelters in Ostend. Two other raids were subsequently attempted, but were unsuccessful, owing to trouble which developed with the engines and the planes. After August 15, no war flights were made with Caproni planes. Work was constantly carried on with the view to rendering these planes fit for service, but until the cessation of hostilities, the only war activities carried out by the night wing were those of the personnel attached to Number 214 Squadron.

The war activities of the Marine squadrons constituting the day wing are considered to have started on August 9, 1918, when three pilots with observers were transferred temporarily to Number 218 Squadron, RAF. These pilots and observers were put into service immediately, and, after participating in three bombing raids, were relieved by other pilots and observers from the day squadrons. On August 21, 1918, three pilots with observers were temporarily transferred to Number 217 Squadron, RAF, and were relieved as above after participating in three bombing raids. Commencing September 5, 1918, six pilots were maintained continually at the RAF pilots pool, Audembert, for practice flights. After successful qualification, they were transferred, as needed, to either Number 217 or Number 218 Squadron, and from there, after actual bombing experience, were sent back to our day squadrons.

On September 7, 1918, the first day-bombing machine arrived in the field, DH-4, Navy A-3295. From that date on, DH-4 and DH-9 aeroplanes were arriving in the field spasmodically. Until such time as enough planes were available for our operations as a unit, we offered to the 5th Group, RAF, all day-bombing planes then in commission. This offer was accepted, and our planes made several raids with Number 217 and Number 218 Squadrons.

CRASHES *marked the route flown from the Caproni plant in Italy to St. Inglevert, France. At Dijon, France, pilot and copilot were injured but survived this landing on soft ground.*

On October 14, 1918, Number 9 Squadron, day wing, with eight DH-4's and DH-9's, carried out the first Northern Bombing Group day raid on the railway sidings and yards at Thielt. This objective was given us by the 5th Group, RAF, a policy which was adhered to in all our subsequent work. From that date until October 27, when operations were suspended to permit establishment of an advanced aerodrome at Knesselaere, eight raids were made, either by Number 8 or 9 squadrons, day wing, or by a combination of pilots from the two squadrons. The raids were carried out with a view to hindering, as much as possible, the retreat of the enemy in this sector. In general, the objectives were railway junctions, yards, canals, and canal docks, at Thielt, Steenbrugge, Eekloo, Ghent, Deynze, and Lokeren. During these raids, when contact was established with enemy aircraft, it is reasonably certain that four enemy aircraft were destroyed, and one shot down out of control. Against this we lost one plane, which was shot down near the Belgian lines, and a second plane which was struck by antiaircraft fire, but was able to glide safely into Holland. In addition to the above combat, pilots of the day wing, operating with Number 218 Squadron, shot down three other enemy aircraft.

In addition to the activities outlined under the operations of the day and night wings, we had several pilots in active war flying with the French Escadrille de St. Pol, and with Number 213 Squadron (Chasse), RAF. These pilots would have been considered available for a Navy day squadron, either chasse or bombing, if one had been organized. One of them, Ltjg. David S. Ingalls, while attached to Number 213 Squadron between August 9 and October 3, 1918, personally and in conjunction with other planes shot down eight enemy aircraft, drove down one out of control, and destroyed one observation balloon.

Summary of Operations

Total pounds of bombs dropped	155,998
While operating with the Northern Bombing Group:	
Night wing	2,670
Day wing	11,614
While operating with RAF units:	
Night wing – pilots	17,200
– observers	121,984
Day wing – pilots	1,905
– observers	625

THE END

Forty-two days of war remained, but action against the U-boat continued at the pace of previous months. Another station was commissioned; several under construction neared completion. As the end came into sight, some cutbacks were initiated in training, and plans for an orderly demobilization were discussed. Otherwise, the momentum gained by months of hard effort showed no sign of slackening until the Armistice abruptly shut off further need.

OCTOBER 1918

1—The airship AT-13, on convoy patrol out of Paimboeuf, approached a suspicious object which opened fire and quickly put 13 bursts near the airship. Being unable to return fire because her only gun was out of action and having alerted escorting ships to the presence of a submarine, the airship gave up the chase and resumed coverage of the convoy.

1—Some of the earliest recorded food-dropping missions were flown by Marine pilots Capt. Francis P. Mulcahy, Capt. Robert S. Lytle, and Lt. Frank Nelms. On this day and the next, they made repeated low-level runs in the face of enemy fire and delivered 2,600 pounds of food and supplies to a French regiment surrounded by German troops near Stadenburg.

4—First of the NC flying boats, NC-1 made its initial flight at NAS Rockaway with Commander Holden C. Richardson and Lt. David H. McCulloch as pilots.

6—Squadron D, relabeled Ten, arrived at La Fresne, France, bringing the Marine day wing to full strength.

14—The first raid in force by the day wing of the Northern Bombing Group was made by eight planes of Marine Squadron Nine which dropped 17 bombs, totalling 2,218 pounds, on the railroad junction at Thielt. For extraordinary heroism on this and an earlier raid in engaging the enemy at great odds, 2nd Lt. Ralph Talbot and his observer, GySgt. R. G. Robinson, were awarded Medals of Honor.

15—The Bureau of Steam Engineering reported that five Hart and Eustiss variable-pitch propellers were under construction for use on twin-engine airships, and that two variable-pitch hubs were on order for test on the F5L.

16—A seaplane on patrol from NAS Wexford, with Lt. John F. McNamara as first pilot, Ens. J. R. Biggs as second pilot, and Ens. George W. Shaw as observer, dropped bombs on a submarine which then surfaced at irregular intervals and eventually disappeared. Search of the area revealed large quantities of oil and some debris on the surface. Although destruction seemed certain, Admiralty assessment was "probably seriously damaged."

17—A pilotless N-9 training plane, converted to an automatic flying machine, was successfully launched at Copiague, L.I., and flown on a pre-set course, but the distance gear failed to land the plane at its pre-set range of 14,500 yards. It was last seen over NAS Bay Shore headed due east at an altitude of 4,000 feet.

19—While escorting a 32-ship convoy in the Lough Foyle sector off Northern Ireland, Ens. George S. Montgomery sighted and successfully attacked an enemy submarine stalking the convoy. His bombs hit within 30 feet of the periscope and brought heavy turbulence and oil to the surface. For "probably damaging" the submarine and saving the convoy from attack, he was officially commended.

22—Ens. Edwin S. Pou, with QM2C H. F. Duffy as observer, took off in an HS-1 from NAS Ile Tudy to investigate the area in which an attack had been made earlier in the day and sighted a mine which they exploded by bombing.

22—The twin-engine airship C-1, commanded by Maj. Bernard L. Smith, USMC, with a Navy crew of Ens. Warner L. Hamlen, Lt. R.A.D. Preston, Ltjg. Donald T. Hood, Ens. M. H. Estorly, and two civilian mechanics, was delivered at NAS Rockaway after a one-day flight from Akron, Ohio, which included a stop at Washington, D.C. The Aero Club of America later awarded Smith and Hamlen its Medal of Merit for this flight.

26—A plane piloted by Ens. W.G. Sprague with H.A. Ropke as observer sighted an oil wake four miles southwest of Penmarch Point and dropped two bombs. Four minutes later, a plane piloted by Ens. Elbert Dent, with Bailey as observer, dropped two bombs on the same spot. A third plane piloted by Ens. Harold J. Rowen, with Bailey again the observer, returned to bomb the same place. Advice from the French credited Sprague with the sinking.

NOVEMBER 1918

1—The night flight instruction program at NAS Pensacola was discontinued.

1—The former French station at Treguier was commissioned as a Naval Air Station with Lt. A. M. Baldwin in command.

5—To reduce numbers being assigned to flight instruc-

THE FRENCH *Astra-Torres, AT-13, a twin-engine airship featuring a tri-lobe envelope, was delivered for operations at NAS Paimboeuf on August 30. The letter "T" identifies these HS boats as from NAS Treguier, France, last of our stations placed in commission overseas prior to the Armistice. First of the NC flying boats, NC-1, made her first flight from NAS Rockaway in October, 1918, and in November took 51 persons into the air.*

tion, a special board was convened at the MIT Ground School to re-examine the qualifications of men on board the Receiving Ship. On the basis of its recommendations, some 400 men were later transferred to inactive duty or other assignment.

11—The Armistice ended the conflict.

With the signing of the Armistice, the hostilities of World War I were over. In the nineteen months of United States participation, the strength of Naval Aviation had grown to a force of 6,716 officers and 30,693 enlisted men in Navy units and 282 officers and 2,180 men in Marine Corps units, with 2,107 aircraft, 15 airships, and 215 kite and free balloons on hand. Of these, 18,000 officers and men and 570 aircraft had been sent abroad.

Sixteen men received their designation as Naval Aviators on the first Armistice day. The assignment of fractional and duplicate numbers to some men and the failure to assign numbers to others who had qualified make it impossible to state how many aviators were trained during the war period, but the total was about 1,600.

Antisubmarine patrols continued after the Armistice until it was certain that all U-boats had left the high seas. Planes from NAS Le Croisic, from which the first overseas combat patrol had been flown in November 1917, were also in at the finish. The last patrol was flown on December 13, 1918, over ships carrying President Wilson and the American delegates to the Versailles Peace Conference.

In the 19 months between the declaration of war and the Armistice, the expansion of Naval Aviation had been rapid and phenomenal. From a single air station at the beginning, the aviation shore establishment had grown to 27 in France, England, Ireland, and Italy, one in the Azores, two in Canada, one in the Canal Zone, and 12 in the United States in full operation. Others were under construction. More than 3,000,000 nautical miles of war patrols had been flown. The submarine had been challenged from the air for the first time, and at least 30 of them had felt the concussion of exploding bombs dropped from aircraft. Large numbers of aircraft had been built, raising the total on hand from a mere 54 at the beginning to over 2,000 at the end. Of these, 570 had been sent to stations overseas. The design of flying boats had progressed through the HS-1 and H-16 to the F5L, the latter an adaptation of a British original. The culmination of this effort, as well as a mark of its progress, was the NC boats which arrived too late to take part in the war, but one of them demonstrated their capability in a trail-blazing flight across the Atlantic in May 1919.

An unprecedented number of pilots, ground specialists, and mechanics had been trained in a relatively new art. Increase in pilots alone was over thirty fold. Colleges, universities, and industry were drawn into the training program. Aerologists and air intelligence officers made their respective bows and became an integral part of the aeronautical organization. The lighter-than-air arm achieved its first successes. A Naval Aviation detachment was the first military unit from the United States to reach France, arriving only two months after declaration of war. At the Armistice, Navy and Marine squadrons stood ready to launch a round-the-clock campaign that would have been the first strictly American air offensive.

At the war's end, demobilization was rapid. Liquidation of overseas bases began in December 1918 in Italy and ended in mid-April 1919 with the closing of those in England. Some, along with much rolling stock and material, were turned over to the U.S. Army for use as assembly centers for doughboys returning home. Some were used by the Committee for the Relief of Belgium. But all were eventually returned to the government of the country in which they were located.

In the training program, men under instruction were allowed to complete their course, but the assignment of new students stopped. Elementary flight training at NAS Bay Shore stopped immediately, and the station became a demobilization center. Miami, Key West, and San Diego continued training until those on board qualified, then reverted to the patrol mission. The LTA school at Akron was readied for abandonment. Ground Schools at MIT (Boston), Washington, and Dunwoody (Minneapolis) began closing. Post-war plans were approved calling for the return of all flight training to Pensacola and the concentration of technical training at Great Lakes.

THE AVIATION STAFF IN FRANCE AT THE CLOSE OF THE WAR. CAPTAIN T. T. CRAVEN, CENTER FRONT

Contracts for over 1,400 aircraft and aeronautical equipment were cancelled, and manufacture of only such items as would be less expensive to complete than discontinue was permitted. Public sale of surplus aircraft was initiated. Ex-Naval Aviators desiring to continue their flying could buy an F-boat for $1,800 – and many did. The HS-2, originally costing $18,480 was offered at a discount price of $6,160, and H-16's were reduced from $33,159 to $11,053. Many aviators, once out of the Navy, started flying schools or operated flying boat passenger service in resort areas along the coast.

On the fiscal side of the picture, recovery of unexpended funds was an early objective of the Congress. Of over $281 million appropriated for Naval Aviation during the war, better than $180 million had been spent or obligated at the Armistice. As the accounts were finally balanced in mid-1919, about $97 million were returned to the Treasury.

Officers and men of the Reserve Flying Corps were released to inactive duty as rapidly as possible. By mid-December, a large proportion of those overseas were on their way home. When Captain T.T. Craven became Director of Naval Aviation in May 1919, only 669 officers and 7,100 enlisted men remained in Naval Aviation, Navy and Marine Corps combined, and the number was still dropping. Some chose to remain in the service, later transferring to USN as provided by law. Many who went home became active in the Naval Reserve when it began organizing in the 1920's, and many, whether in the Reserve or not, returned to active duty to serve with distinction during World War II – a few still in flying status.

The war was over. For the time being at least, the world had been made "Safe for Democracy." At the end, Capt. Craven, who had had over-all command of stations in France, wrote the introduction to a history of his command. In it he paid tribute to his men in terms that also must have been applicable to men of Naval Aviation everywhere. He wrote: "The credit for carrying on and the completion of the work of aviation in France belongs essentially to the young men who joined the service from civil life. Unfamiliar with Navy methods and entirely unaccustomed to the curious existence which, in many cases, became theirs in isolated districts, their efforts everywhere provoked the most enthusiastic acclamation. Breaches of discipline were very rare, and it is believed that the personnel of the aviation service quit France, retaining everywhere the admiration and respect of the French people with whom they were associated.

"To the flying personnel the highest commendation belongs. No instance of flagging or failure in attempting the dangerous work assigned them was ever noted. Many paid the supreme sacrifice in their devotion to duty, and the skill and courage with which all acquitted themselves everywhere were praised by the older flyers of the Allied services with whom our young men were associated.

"Aviation left the scene of its activities with pride in its work born as a result of successful achievement, of having been a part of the Navy, and of having assisted it to bring to a conclusion the considerable problem assigned to the Navy during the World's War."

There can be no doubt that the men of the Naval Reserve Flying Corps met the challenge of war and contributed their fair share in carrying Naval Aviation through its first test of strength. Although there were heavy seas ahead, the course was clear.

In some respects, the war interrupted the direction of the initial growth of Naval Aviation, but the interruption was only temporary. From the beginning, its development had followed a course toward the integration of aviation in Fleet operations, and, by the time the country went to war, experiments with aircraft operating from ships were in full progress. When war came, however, all Naval Aviation effort was diverted to immediate needs. Experiments with shipboard operations came to an abrupt halt, and, although naval aircraft carried out Navy missions on the sea, operations with the Fleet were the exception rather than the rule. But the experience of war had clearly demonstrated the potential of aviation as an arm of seapower. Although some skeptics remained, many had been convinced by wartime accomplishment that the future of aviation lay with the Fleet. Time would prove the wisdom of their thought as post-war effort again stressed integration and another world war found Naval Aviation spearheading the attack.

☆ U.S. GOVERNMENT PRINTING OFFICE : 1975 O—577-819

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